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ROYAL COMMISSION ON MATTERS OF HEALTH AND SAFETY
ARISING FROM THE USE OF ASBESTOS IN ONTARIO

CHAIRMAN: J. STEFAN DUPRE, Ph.D.

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APPEARANCES:

Mr. T. Lederer

Government of Ontario

180 Dundas Street
Toronto, Ontario
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VOLUME 41

ROYAL COMMISSION ON MATTERS OF HEALTH AND SAFETY

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Volume 41

THE FURTHER PROCEEDINGS OF THIS INQUIRY
RESUMED PURSUANT TO ADJOURNMENT

APPEARANCES AS HERETOFORE NOTED

DR. DUPRE: We will come to order, please.

It's my pleasure this morning to welcome most
warmly Mr. Ross Hunt of the British Belting and Asbestos
Group Limited.

Mr. Hunt, you have come a long way and you are
very welcome, indeed.


Miss Kahn, would you swear in the witness, please?

ROSS HUNT, SWORN

EXAMINATION-IN-CHIEF BY MR. LASKIN

Q. Mr. Hunt, I wonder if you would be good enough
to start by just telling us briefly your educational background
and your professional qualifications?

A. I was educated in Scotland until the age
of sixteen-and-a-half, when I went to London University.



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A. (con'td.) I was there reading for a science degree in physiology, and the war came. I then went away to the war for six years.

I returned and I completed my education. I then continued on with the work that I had been doing during the war, and that was investigations into tropical diseases.

I carried on with that in various countries throughout the world, for the Ross Institute of Tropical Medicine, which is part of London University.

In 1959, for diverse reasons, I came home for a period that I thought would be around three years. Shortly after I returned, I was in the London School of Hygiene when the professor of industrial hygiene approached me and asked me if I would like to have a go at something quite different.

I said, what was that, and he told me. I said, oh, yes, all right, because I had considered then going to spend some years in the Wellcome Research Foundation, doing some work on research. So I said, yes, it sounds fun.

Well, that was in 1959, and it is now 1982, and I like to think we are a little further forward than we were then, but it's a slow job.

I was used, in those days, to looking at disease which manifested itself within hours, if not days or weeks, not two or three decades, so I had to alter my sights.

Q. So that you have been involved in the study of asbestos and looking at asbestos continuously from 1959 to the present?

A. That's right. Almost entirely.

Q. Have you been employed by BBA since 1959?

A. I have, with secondments to the MRC and allowed to do what outside work that I feel is necessary to do something for the image.

Q. What is your present position with BBA?

A. I am research physiologist and I have charge of the industrial health research unit.

Q. That's a group of how many people within BBA?

A. Well, I have two. There's twenty in one lot, and five in another. That's about eighty miles away, where we have another processing plant, you see, and so we have...it is not complete duplication of the one in Cleckheaton, because that has a lot of research equipment, but seventy-five altogether.

Q. What role does the industrial health unit play within your organization?

A. It was primarily set up by myself in 1960, February or March, to investigate the biological effects of asbestos fiber, primarily in the work force, but it didn't stay there. It gradually grew to doing, looking at other people, doing work for the government.

We were, I believe we still are, the only type of unit there is in British industry at the moment that is devoted wholly and solely to the investigation of irreversible situations like asbestos.

In the last eight years, perhaps, we have gone on, we have proceeded into other forms of challenge to do work mostly in either the proven or the unproven carcinogenic substances, and also various solvents which are monitored and so on and so forth.

In fact, the work that I do can be, I suppose, rapidly summed up that my work starts when the huge containers come from this part of the world, and it stops in the mortuary. All phases in between, I am concerned with.

Q. What type of asbestos products does your company manufacture?

A. There are two distinct companies within this

5 A. (cont'd.) English setup. One is called Scandura, and it makes asbestos textile yarn, cloth, various types of material for later inclusion into friction materials...that is, asbestos being mixed with metals of different kinds, and with lead and all manner of things.

10 Then the other half of the concern is to turn either the textile or asbestos fiber with various mixes into friction materials of all kinds.

15 The third type of industry that is carried on is the manufacture of conveyor belting for the coal mines and other people, but it has hazards insofar as it has PVC in it, but otherwise there is no asbestos.

20 Q. If you would just look at the sixth paper in that book of papers you have in front of you, am I correct that this is the written submission made by the BBA Group Limited to the Simpson Committee?

25 A. Yes. It's a long time since I saw it, but I recognize it as being that, yes.

30 Q. All right. Can I just take you to page twenty-three of that document?

A. Yes.

35 Q. And I'm interested in learning a little bit about the disease history, or otherwise, at BBA, at least during the time you were there, and there appears at least to be some statement here about the experience of the group at a particular weaving shed, and I'm looking at paragraph three point two.

A. Three point two, yes.

40 Q. Can you, looking at that paragraph, can you give us the broader picture of what the history has been at your organization, at your company, in terms of asbestos-related disease?

A. Well, as you see here, it says from 1952 onwards.

Hunt, in-ch

Q. Mmm-hmm.

5 A. Now, that would make it thirty years. We have, however, and if you don't mind me referring to the fact that I mentioned last...sorry, yesterday...I was putting it at 1954, 1955, because one of these people showed up. This is incorrect.

Q. What we see here...

A. It was correct at the time, but it is not correct now.

10 Q. All right.

A. One person who came in 1953...

Q. Yes?

A. Developed asbestosis.

15 Q. After you...between the time you made this submission and...

A. Now.

Q. ...the present?

A. But he had left. He was not an employee at the time when I found him.

Q. I see.

20 A. You see, we have a recovery system where we look after, recover all the people, but it takes time. One person, there may be others, I cannot say that...I can only talk about what I know, and there's one since then. So that spoils that fifty-two figure.

25 DR. UFFEN: Should we change it to fifty-four, just in passing? As best you know now, it's fifty-four?

THE WITNESS: That is correct. I have no objections that. No, no.

DR. UFFEN: I'll just make it a correction in the paper.

30 MR. LASKIN: Q. The paragraph says:

"Our own experience in a particular weaving shed",

Q. (cont'd.) and is the statement there intended to refer to only one plant, or is the statement true for your entire company?

THE WITNESS: A. "In a particular weaving shed", is meant, it's a bit ambiguous, because there are, I think, three weaving sheds. Only one weaves asbestos. The other weaves cotton and nylon.

You see, we call it weaving three, it used to be known as. But it is no longer there anyway. This is all...this is very historical.

The plant was completely dismembered in...fifteen years from now...1967, and this was the place that I was telling you about.

Q. Well, let me...perhaps I can get at it another way. First of all, can you tell us approximately how many employees your company on an annual basis has working with asbestos or exposed to asbestos?

A. This is referring to asbestos textiles. You mean overall within the confines of friction materials as well as textiles?

Q. If you can. Just a rough figure. Are we talking about a lot of people or a very small number?

A. Eight hundred.

Q. On an annual basis?

A. The turnover rate..I'm afraid the turnover rate is so sketchy, and like any other concern we have had to work under the constraints of recession, and a very large number have been made redundant in this time.

Q. All right.

A. But we have eight hundred now.

Q. Is the statement true that amongst all of these employees who have been exposed to asbestos, and previous

5 Q. (cont'd.) employees since 1954, that basically you haven't seen any evidence of asbestos-related disease in any employee who started to work since 1954?

A. That is correct. You see, this rather tends to lead you on to the fact that this statement as regards with 1952 is concerned with this weaving shed.

Q. Yes.

10 A. I am saying to you that...I mean, I do not work for Scandura and I do not work for Mintex. I am wholly and solely employed quite independently as far as these firms go, and there has been no case of lung damage that we can detect, either physiologically or radiologically, occurring in any person who joined the firm, or joined this concern, from 1954 onwards.

15 DR. DUPRE: Could I just interject with a question on the numbers here?

As I understand it, you have a work force of about eight hundred a year?

20 THE WITNESS: No, the work force is about three thousand. Eight hundred are exposed to asbestos.

DR. DUPRE: Of whom eight hundred are exposed to asbestos?

THE WITNESS: Yes.

DR. DUPRE: Now, do you have any feel for how many of those eight hundred might be called long-term employees?

25 THE WITNESS: Yes. At this moment...you mean as of now, as we sit here?

DR. DUPRE: Yes.

30 THE WITNESS: Because it's an easy question if you had asked me some time ago, because in a redundancy situation, as I'm sure you know; last come - first out, so we've got rid of a lot of the more recent employees, if you follow.

DR. DUPRE: Yes.

5 THE WITNESS: There have been some who have worked there fifty years - very few, but some. Of the eight hundred, I would say well over half - perhaps five hundred or more - have not got more than fifteen years in, fifteen to twenty years.

DR. DUPRE: Five hundred...about five hundred have worked fifteen or more years?

THE WITNESS: Not more than fifteen years.

10 DR. DUPRE: Oh, I see. So about five hundred have worked between one and fifteen years?

THE WITNESS: That is correct, yes.

DR. DUPRE: And that would mean that the remaining three hundred...?

THE WITNESS: Were there before I came.

15 DR. DUPRE: Were there...

THE WITNESS: That's how I work it out, because I know most of them.

20 DR. DUPRE: So we are certainly looking at an employee population that has three hundred people who have been there for a long period of time, since...

THE WITNESS: If you don't mind my saying so, the question is not an easy one insofar as I do not regard a person who has worked there for any length of time, and who leaves, as having left.

25 DR. DUPRE: Right.

THE WITNESS: They have been challenged and perhaps insulted. The fact that they have left the firm, they have not left their insult, which is within them, and so there's probably more than three hundred who come through my books because we keep a detailed followup system on all people with more than two years exposure.

30 MR. LASKIN: Q. Can you give us some idea of what

Q. (cont'd.) the fiber levels, the measurement levels, have been in the company since the time you have been there?

5 THE WITNESS: A. Yes, it would have to be since the time I was there, because before I came they were not counting fibers. Nobody was, for that matter.

They were counting particles, and they assumed that everything that didn't burn was asbestos.

10 There was a general feeling that between five and ten fibers per mil was not too outrageous, because at that juncture, as you know I'm sure, because of the prevailing definition within the Factories Act that no asbestos fiber should be liberated, of course it's like asking Mr. Campbell to make soup without the smell of vinegar. You cannot do this.
15 It cannot be done, it's impossible.

So the levels were very arbitrary. I have known levels of one hundred and fifty fibers per mil. That was beyond the...there was a time when men used to work overtime because they couldn't see the clock on the wall. This is not a jest, it's true. Now what kind of figures they were, I have no idea.

20 But I suggest that this was not diffidence so much as ignorance on the part of the management in those days.

Since I have been there, I have seen the levels come down. In 1964, we issued an instruction to the engineering department that the exhaust systems, wherever possible, should
25 be so increased, or the number of input heads be increased, so that we would not see a figure greater than two. That was in 1964.

That was just prior to the first meeting in New York on the biological effects of asbestos. We spoke of that there.

30 Q. Having issued the instruction, did you get the levels down below two?

A. Oh, yes. We have the Roycos to help us, you see.

5 A. (cont'd.) You see, if you have a machine like the Royco machine, you do not have to tell an engineer to wait until...I'll take the sample now and I'll tell you what it is on Saturday, because it used to take two to three days to prepare a membrane and count it...these machines were able to do the job at that time.

So the engineers would be called down and say, look, look what it is. Do something about it.

10 Then you can work the machine yourself, you can see how much you have improved it. So within a very short time we had levels down below two.

Q. In all of your operations?

15 A. No, no, no. No, no. No, there are some handling operations which almost defy, quite frankly, engineering - the stacking of materials, the stacking of friction materials. A man does not have time to place one line or one...gently, gently...without any kinetic energy being released.

Now, this is all done in exhausted booths now, but it wasn't then, and so they wore face masks.

20 Q. But I take it generally speaking in your operations, except for...

A. In the textile operation it could be done, and was done.

Q. And was done. And generally in friction operations, but perhaps not the stacking aspect of it?

25 A. The actual grinding, drilling, the various traumatic effects upon this material, they were all exhausted... I would suggest not entirely because of the health aspect. Because if you didn't exhaust a system, you were so covered with dust that you couldn't see whether or not the material was free of cracks and things like that, and so it was from a manufacturing process that dust had to be removed. We merely asked for an
30

A. (cont'd.) improvement on the exhaust so as to bring levels down.

5 Q. Ultimately, Mr. Hunt, I think what I would like to ask you is, what your own judgement is as to the reason why you appear to have had in your company at least, since 1954, a disease-free environment, if I can put it that way?

10 A. In 1953, 1954, they built within this particular weaving shed, and elsewhere, a complete new system of engineering ducting. I believe it to be, the reason for this being that the other was so antiquated as to be really a disgrace. Anyway, they built it and it was very efficiently done.

15 When I arrived there some five years later, I was finding counts of two, maybe one or two or three, in this particular shed.

15 DR. DUPRE: What year would that be, again?

THE WITNESS: Well, I got there in July, 1959, and I would say this the end, or the beginning of 1960.

You see, to be able to do this, we had to develop a counting system, which we did.

20 DR. DUPRE: And the new ventilating system was installed in 1954?

THE WITNESS: Don't hold me to a year. I don't know whether it's 1953 or 1954. It was one of those.

25 DR. UFFEN: Did this ventilating system have humidifiers in it?

THE WITNESS: No.

DR. UFFEN: No?

THE WITNESS: No. We wouldn't have humidifiers in that. That would be a disaster. Asbestos is very...it loves water, and if it took up water it would stick.

30 DR. UFFEN: In the ventilating system.

THE WITNESS: Are you talking about whether

THE WITNESS: (cont'd.) we compensated with additional moisture?

5 DR. UFFEN: No, I'm just trying to get at, what is the best kind of ventilating system to get down to one fiber per milliliter, and so on.

10 In the United Kingdom, where the humidity is often very great, you might not have humidifiers. But in a climate where it's dry for long periods of time, is it necessary to have humidifiers. Then you surprised me when you said that would be a disaster.

THE WITNESS: Well, in the carding section the desire is to have as little moisture as possible. In the spinning section you want a little moisture just to prevent the things breaking.

15 If you have a weaving or spinning section and a carding section in the same building, you have a little trouble on your hands.

20 So the carding machines are exhausted quite separately and are enclosed, whereas the weaving, the spinning departments, have a little air, have a little moisture coming in to compensate for this.

DR. UFFEN: May I just pursue this?

MR. LASKIN: Mmm-hmm.

25 DR. UFFEN: Are there any plants where in, say carding, where you would deliberately dehumidify?

THE WITNESS: Not to my knowledge. Not to my knowledge. No.

30 The only...another reason for keeping the moisture down is that within the carding machines they have enormous magnets to take away the iron which is present in chrysotile, because that is not a desirable thing to have if you are going to use asbestos as an insulator. You don't want...

THE WITNESS: (cont'd.) Now, these tend to get rather rusty if you have a lot of moisture.

MR. LASKIN: Q. All right. So that...

THE WITNESS: But I would like to say that the best exhaust system, there is no answer to that because every individual job has to be tailored for its own exhaust.

DR. UFFEN: The reason I pursued this is that we have been told that it's not possible to maintain less than two fibers per milliliter in some kinds of plants. We've also been told that it's not too difficult to get down to one. We've also been told that it's very difficult to get to and stay below one fiber per cc.

So if we come back to this kind of questioning, you'll understand why.

THE WITNESS: Yes. It seems a bit highhanded to say that if a job is done properly, it is possible. If it's botched and not...if you try and improve a system, you very seldom attain what you want, you know, to do the whole thing from scratch.

MR. LASKIN: Q. Do I take it, Mr. Hunt, that you attribute this new ventilation system that you started to describe, as being the primary reason why your company was able to get its levels down by the early-sixties or the late-fifties?

THE WITNESS: A. Yes. The trigger was having the environmental engineers, having them come to us, looking down the microscope, looking and taking these machines apart to see how they worked, involved in everything to such an extent that they became one with us.

Having done that, they became interested in keeping these things down, because they were then able to see what we were seeing. I thought that was very important. So they became... it was a matter of pride with them.

Q. But you also have at your company, as I understand it from reading these materials, an early screening program, which I take it you administer?

A. Physiological screening?

Q. Yes.

A. Mmm-hmm.

Q. Could you just describe that briefly for us?

A. In 1960, when I began to devise and work with and talk with other people about the parameters that we would need to be very, very sure of as far as respiratory physiology goes, we thought, quite wrongly...I admit here that I was completely mistaken...we thought in 1960 we should perhaps screen people. We looked at two ways of doing it. One was an immunological way, which we failed to find and nobody else has found one yet, and the other was to see whether an individual's respiratory function was, let us say, good enough or whether it would stand up to the rigors of challenge from asbestos.

I have to tell you that for some time we probably did a lot of people no good at all - I did. Because we allowed people only, for two or three years, to be admitted into the factory provided that their ability to force ventilate in one second an amount of air that should not be below seventy-four percent of the total, thereby indicating that their airways were free, that they were not bronchitic, and that apart from... you see when they came, when they were employed, they would then come for a full lung function study. Well, this takes over an hour, and in fact it takes a lot longer in that it takes them an hour and it takes us a further hour to process the results - gas analysis.

It's quite an expensive thing...it costs about forty pounds, or eighty-odd dollars a time, to do this....and

A. (cont'd.) to do this on everybody who would come seeking work, we felt we couldn't afford to do it.

So we did a shortened test, which was what I was talking about first of all.

However, later on it became...not evident, but reasoning suggested that we were letting the wrong people in. The people who should be allowed in to an asbestos factory are the ones who have impairment of breathing, for a simple reason. That if their airways are patent, they are capable of taking down whatever dust is there, and of course being the shape it is, it goes down very slowly, but asbestos dust does not enter the lung in an airstream. It goes down/^{so}far and slips down by gravity later on.

But if their airways...and if they were hoicking and spitting and had a lot of bronchial secretions, the chances of the dust getting there is very remote..as it turned out to be.

So we still kept on with the shortened tests, but they were merely for record purposes only to see whether or not the baseline, whatever the baseline was, improved or got worse as they remained with the company.

But it was not...did not develop afterwards into a screen for the purpose of rejection. Oh, no.

But you can hardly say to a man, look, your airways are too good, you are too fit to work in the asbestos industry. That wouldn't have been a feasible thing. We merely took note of it then.

DR. UFFEN: Could I intrude here? You won't be surprised that this a bit of a surprise to me, what you've just said about the air. Would that include smokers? People who have smoked all their lives and have got bronchial conditions, and as you said, coughing and spitting, they would be the best ones to put into an asbestos condition in a plant?

5 THE WITNESS: Yes, there's two reasons. One is that by the time a smoker is affected by his throat, he is around about forty, forty-five. I mean, a man can be smoking fifty cigarettes a day at thirty and you would have quite a job to detect it. The damage doesn't become evident.

10 So there we have, say...if you follow the Bible... you have twenty-five years left, or twenty years of three score and ten. Now, the chances of even developing, and indeed living to see it develop, is quite remote.

So a smoker who smoked all his life would be, for my purpose, a good candidate to go in.

It was not myself who worked this out. It was a study of coal miners.

15 DR. UFFEN: We have a job for you when you retire.

I won't pursue it now, but it may take me a little while to digest this, because it's quite different, as you may have guessed, from advice that I think we have been receiving at previous hearings.

20 THE WITNESS: Well, the first person who made me aware of this was Dr. Gilson. You may have heard of him.

It was he who said, you know, I've been looking at these coal miners all these years and it is a fact that bronchitics or quasi-bronchitics can not admit coal into their alveoli, and I began to think about that.

25 So we developed a polarizing system where we could examine lungs under a polarizing device that would allow us to track the asbestos, as to how far it got down, and we found that Gilson was right.

It was easy with coal, because you can see it.

30 MR. LASKIN: Q. To come back to Dr. Uffen's example of smokers, the evidence we've heard is that when you

5 Q. (con'td.) put asbestos and tobacco together that you multiply the risk, or come close to multiplying the risks, of an asbestos-related disease, particularly lung cancer.

THE WITNESS: A. It sounds good, doesn't it? It really sounds as though it should be that way. I don't believe it is. We have no support to support it.

10 DR. UFFEN: Oh, epidemiological evidence comparing smokers and nonsmokers after the facts is on our record several times over.

THE WITNESS: Yes, but we have no nonsmoking asbestotics.

DR. UFFEN: You haven't?

15 THE WITNESS: None. They all smoked, at one time in their lives, so we have nothing to compare them with.

In fact, you could say that we were in the presence of a total smoking population. Very, very few people did not, at one time, smoke, and therefore statistically I can't help you. I don't know. I can only go on what I see, not what I read in the journals.

20 MR. LASKIN: Q. When you use the term asbestotic, are you referring...when you say asbestotics, do you mean people who develop asbestosis?

THE WITNESS: A. Yes. You used the term that has been used for the last ten or so years, asbestos-related disease, meaning the other two.

25 Q. Yes.

A. Asbestosis is essentially...I don't have to tell you, you must know what it is.

30 Q. I just want to know if we're on the same wavelength. When you use the term asbestotic, do you mean asbestos...

A. I do.

5 Q. All right. Can I, just for a moment, just pursue this examination program, and what I'm really interested in is what I think I read in your papers about your examination of employees for early signs of asbestosis, and your recommendation to remove them from further exposure.

A. Oh, yes.

10 Q. Am I correct that what you do is lung function tests?

15 A. Yes. It's very delicately poised physiology, leaving...or taking away as many of the variables as we can, so that any change is attributable to the person, to the lung, and not to outside influences.

20 But we need...there is...there are severe restrictions into the information that one, isolated lung function can give you. One x-ray, one decent picture, can tell you a great deal about the pleurae, about the diaphragm, heart and everything else.

25 Now, we are, as far as lung function studies go, you would have to have quite severely-thickened pleurae before it started to have some effect on the parenchyma, on its ability to open and to fill up and empty itself, and so we thought in these terms - that if could register and by dint of repeated measurements be sure that an individual was below that which the regression curve shows he should be, and upon repetition that he was declining, and these repeat tests went over two years, and there was a decline. But the x-ray was in no way bad enough, if you like, either to get him moved or for the PMP, Pneumoconiosis Medical Panel, to certify him.

30 After many pleas to the PMP that they should adopt a system as they have for the coal miners, that you could certify a person without paying him any compensation, they decided regretfully that they couldn't do this, that a man would only

A. (cont'd.) be certified provided he was bad enough to warrant a payment being made to him.

5 Now, this was a long time after the horse had left the stable, and this was the reason why we put it to the management and convinced them that these changes that we saw physiologically were real changes, and that although they did fit other diseases like sarcoid fibrosing, cryptogenic alveolitis, collagen deposits from other causes, that the most likely thing
10 was that it was caused by asbestos. They accepted this, and so these men were removed, and they were compensated fully in payment.

I don't...I won't deny the fact that when they were first told or when they were first asked to move, and they were told why, they were upset because they themselves felt
15 nothing, they were quite fit. To be told that there is something wrong with you that you were completely unaware of is quite a shock.

But when we explained that really the changes were so very, very slight, but better they go now than later when they became aware of it themselves, that placated them no
20 end and so the whole thing was successful and we went on to do it over many years.

Q. Are you still doing it?

A. No, we don't find anything that warrants it anymore.

25 Q. Have you...over what period of time did you do it?

A. Seven years.

Q. Approximately how many people did you remove from further exposure?

30 A. Including mistakes, about seventy-five.

Q. Did you then follow them? Have you followed

Q. (cont'd.) them over time?

A. Oh, yes. They were my personal responsibility.

5 Q. All right. Have you found any evidence of asbestosis?

A. Yes. Two went on to develop asbestosis, one died of tumor, the other one is still alive.

Q. And that's the only...

10 A. But the remainder is quite well. We had three mistakes - three improved and that is impossible. You cannot improve from asbestosis. This was an inflammatory situation that I had misread, and they got better and they returned.

These two did. One didn't want to go back anyway.

15 Q. And the vast majority, what, stayed the same, didn't worsen...

A. Most of them are retired now.

Q. But in terms of their...was their any progression?

20 A. No, this is the point. They went down...they continued to decline to a plateau beyond which they did not go. You can't just turn the tap off, because the fiber is going to go on doing something nasty.

But at that stage, they still have a great number of functioning histiocytes left. The fibroblast population is not all that strong.

25 Q. Does there, in your judgement, come a point where...in the progression of a disease...where it becomes no longer sensible to remove from further exposure, and if the answer is yes, where is...

A. Of a disease? What disease?

30 Q. Asbestosis. Where is the dividing line? At what stage does it become...

A. Oh, that's not a fair question.

Q. Okay.

A. I'm sorry. I cannot answer that because the individual predisposition towards development of collagen, and the continued development of collagen and the production of fibroblasts is an individual one. I'm sorry, I can't do that.

But I do know that in a great many people by the time the x-ray has enough evidence to warrant them being called asbestotics, they are already on the way to a right-sided heart enlargement and an early demise. I can't say more than that.

DR. UFFEN: Could I pursue the three cases that you called mistakes? Because we've had lots of discussions with other people about reading x-rays, and we are aware that when changes start to occur, they don't occur so suddenly that you can be absolutely sure that there is a significant change.

Now, are there circumstances where the person who reads the x-ray could quite legitimately think it's asbestos, or potentially asbestos-related, and subsequently discover that he was wrong? Like your three mistakes, I would gather, were justifiable misreading...

THE WITNESS: Of what?

DR. UFFEN: Of the x-ray.

THE WITNESS: No, I'm not talking about x-ray.

DR. UFFEN: I'm sorry, then, I misunderstood.

THE WITNESS: This is pure physiology.

DR. UFFEN: There are no x-rays in the...these are just lung function tests, then?

THE WITNESS: Yes, but the x-rays are there only to bolster the claim that there was no x-ray change and yet there was physiological change. This is what I'm saying.

But I can answer your question.

DR. UFFEN: Okay. Well, then answer it, because I'm trying to understand. I'm not medically trained and what

DR. UFFEN: (cont'd.) I'm trying to find out is, are there any other relatively common chest conditions that could be mistaken for the beginnings of asbestosis?

THE WITNESS: Not common.

DR. UFFEN: Not common?

THE WITNESS: Not common.

DR. UFFEN: Any at all?

THE WITNESS: Oh, yes. I don't think this is tales out of school, but you see, you've heard of EMAS here? You've heard of the word EMAS - Employment Medical Advisory Service? Have you come across that?

DR. UFFEN: No, that's new.

THE WITNESS: Oh, this is a very important thing in England, EMAS. EMAS have, or they decided in 1969 when the 1969 Regulations became operable - 1970 - these are the ones that took over from the 1932 Regulations, where a specific recommendation has been made as the result of the committees upon which we sat.

EMAS was then formed and EMAS decided, various people decided, the policy division of the H and SC, decided that they would start a survey.

Now, this was a survey - a prospective survey, not a retrospective one - but in 1969 there is a survey whereby they came around to all the factories that were processing...I say all, to make it simple I would say all...that were processing asbestos, they did atmospheric counts and took x-rays. Every man was x-rayed.

The enormous form was filled in by the health department...you know, the firm's health department...all the details of every man, as to whether he had rales, or persistent rales, or paroxysmal rales, all this kind of thing, his smoking history and oh, everything about him. This was sent in for computer analysis by the...to London.

5 A. (cont'd.) It was by way of being half a request and half an order, and you really couldn't ignore it. This went on for some time. The x-rays were taken every two years. They were deliberated upon by four people, who gave their readings blind. I mean, they didn't know who...they merely had a number.

10 This went on for about four years. I think it was in 1975, we all attended a meeting in London as to the initial value of this work, and then we learned that of the initial x-rays that had been examined by these four people, there were, I think, twenty-six cases whereby they were thought to have asbestosis or in the early stages of asbestosis, and that was that.

15 My criticism of any of this is the fact that this was merely a survey. They didn't even bother to tell the... they may have had to read them blind, but they could have got back to the name quite easily through the computer and then informed the people, informed the firm for whom they worked, that we believe this.

20 But they didn't. It was merely a study, and I don't like studies like that. It doesn't do the man on the shop floor any good.

25 Anyway, the big laugh came when after four years, the second set, they showed that there were only twelve, so at least thirteen people had recovered from asbestosis, which is nonsense.

So the readings...then it was stopped. They realized that they couldn't do it this way.

30 These were four quite highly-placed radiologists. It can't be done because of the different interpretation, even of the ILO classification. It couldn't be done. People do not recover from asbestosis.

5 DR. UFFEN: The other part of my question is, are there certain medical conditions, even if they are not commonplace, that could be mistaken...

THE WITNESS: Yes.

DR. UFFEN: ...quite legitimately by trained doctors?

THE WITNESS: Farmer's lung, sarcoidosis, fibrosing alveolitis.

10 DR. UFFEN: What's the last one?

THE WITNESS: Fibrosing alveolitis - normally called cryptogenic because nobody knows what starts it.

15 Perhaps the commonest one before penicillin was ordinary pneumonic fibrosis, and it certainly fooled me a number of times until I...we got a method of measuring the degree of fibrosis by diffracted light under the microscope and we could differentiate between ordinary pneumonic fibrosis and any other cause.

But for some time it was very difficult, certainly it was in x-ray.

20 DR. UFFEN: Just one more question on that. What would, in your opinion, be the best way to deal with it - have more than one person read the medical evidence, the x-ray included, or do the examination more often? Is it important to have several opinions?

25 THE WITNESS: Oh, I'm sorry. I beg your pardon. That was a full stop? To do the examination more often, did you say?

DR. UFFEN: Either, yes. To do it more often or to have several medical assessments, several medical opinions at the few times that it is done.

30 THE WITNESS: This is of everybody? This is not people whom you suspect of disease? Everybody, irrespective?

DR. UFFEN: No, I had in mind people you suspect of disease.

5 THE WITNESS: Well, could I answer that by saying in 1963, I contacted a chest physician, a specialist, in a town not far from us, and I suggested that he would, for an annual fee, start up with me a chest clinic, an asbestosis clinic, and that has been running now for nearly twenty years. He does the clinical work and I do the physiology and the post-mortem work as and when it's necessary.

10 We believe that in that time we would have, and have, done the very best by the man on the shop floor, that could be done - insofar as he is not...he is seen only by one man.

15 When you are seen by more than one man, more than one specialist, then you start getting differences of opinion and this is a very subjective thing. But here we have just the one man, and there's me.

20 Now, I don't have to be subjective because I'm doing...it's a scientific thing. The instruments tell me. I can interpret what the instruments say, but I don't have to say to myself, that is a rale, or that is a wheeze, and that's caused by this and that and the other. That is his job.

25 In so doing, we have...although there's no way...we have saved some cases of mesothelioma - at least we have prolonged their life - by getting them operated on very, very early, very early, and having pleurectomies done.

They all died eventually, admittedly, but we were able to relieve them of a lot of the pain. So even for that it has been worthwhile.

30 The trouble is, when you start getting various people of the same discipline pontificating on one individual, then you get the differences coming in - I believe this, and I believe that.

5 DR. UFFEN: See, this is rather fundamental to the process of assessment of liability in various workmen's compensation procedures, if you hadn't guessed. That's why I'm asking you.

THE WITNESS: Well, we have the same trouble. We have the Pneumoconiosis Medical Panel, and we have frequently run into great argument with them when they have either not certified a man, or they have certified him. Eventually at 10 post mortem I'm afraid there's a lot of 'I told you so' business coming in, because invariably they were wrong.

But that would be most undignified, you know, to try and talk too much about it, but it does exist.

We are all fraught with frailties, sir.

15 DR. UFFEN: Pardon my irreverence. I'm not medically trained, so I'm not too concerned about the dignity of the medical profession.

THE WITNESS: I'm talking about dignity, talking about somebody else in their absence.

DR. UFFEN: All right.

20 MR. LASKIN: Okay.

DR. UFFEN: I think I've interrupted you...

MR. LASKIN: No, no. That's fine.

DR. UFFEN: I find this testimony very interesting, so if you don't mind I'm going to interrupt a lot today.

25 MR. LASKIN: That's fine. That's fine. Dr. Uffen. Please do.

MR. LASKIN: Q. Can I just switch topics slightly? Looking at...if we still look at that tab six that you have in front of you, and turn to page twenty-four, I take it from reading the little summary here that your company no longer uses crocidolite? 30

THE WITNESS: A. That's true.

Q. When is the last time, knowingly, BBA Group did use crocidolite, to your knowledge?

5 A. Oh, dear. I think 1964/1965, they no longer made a substance...it's called wormold...I have no idea why they called it wormold (phonetic)...but it was a blue asbestos mix for the manufacture of friction materials.

10 But they had made this for many years. They also, in another department, used...up until about 1967 or 1968...blue asbestos cloth as a device for what they call compensator seals, and they are used in power houses where the fumes are so acid it would destroy chrysotile, so in the event, this is no longer used because manmade fibers are used instead.

15 Now, this would be, what, sixteen years ago, something like that...fifteen, sixteen, seventeen years...and that is the one thorn in the side, I think, of the likes of me, and I may well have to retire before some of those men might show up, and there's nothing I can do about it.

Q. Has your company used amosite at all?

A. Never.

20 Q. When it did use crocidolite, was it used in large quantities, or are these small quantities?

25 A. Relatively small compared to the amount of chrysotile. I don't know what bearing that has, quite frankly, as to the hazard. I don't think you can negate the hazard saying oh, they only used a little bit as compared with a lot of the others.

30 Q. Is the statement that is contained here at page twenty-four, is it still true today that of all of the mesotheliomas you have discovered in your company, all of those persons have had some crocidolite exposure?

A. Yes, unfortunately.

Q. And...I mean, the submission makes a point of

Q. (cont'd.) that...do you also make a point of it? Is this fortuitous, or is this what you would expect from your experience?

A. Oh, of course I expected it, because I didn't only find it in our people. I don't know where to start.

I made a machine, a low-temperature asher, and in 1962, I started...see, if you take lung tissue and you destroy it by heat conventionally, you destroy the asbestos, oddly enough. It can't take that heat, and you can't find it.

If you don't destroy the asbestos, if you don't destroy the tissue, you can't examine it. Ordinary pathology is not good for looking at tissue, for us.

You can look at the architecture of the lungs, but for what has caused it, the inclusion materials, you cannot use the ordinary histological techniques.

And if you use heat to destroy the tissue, you have to take tissue through into a carbon and then the carbon is joined up with oxygen to form a gas, and only then are you left free of charcoal and you merely have the inorganic inclusion materials...and it can't be done by heat.

So we used radio-defined heat, so that we made monatomic oxygen...O, not O²...and O would form to join CO, not CO², and in such a way you can destroy tissue at a hundred C, destroy it completely.

You can put a small animal like a mouse into a machine, and put it under the and you will destroy it, there will be nothing left - no bone, no nothing - just calcium and iron, and this is a very useful tool because it allows us to see...take any quantity of lung, enormous quantities...and in so doing, I found crocidolite in every case.

Q. Of mesothelioma?

A. Yes.

Q. But did you also find chrysotile?

5 A. Whether it's the cause of mesothelioma, I do not know, because the recent work done by Elmes and Pooley and Wagner suggest that tremolite may also have been the, either an additional or the primary cause.

When we got some of our stuff, went back and got some of the old slides and looked at them, we found indeed it wasn't crocidolite, it was tremolite.

10 But there was no proof. It just made you be very, very careful, because you can, by refraction methods, differentiate between tremolite and crocidolite under the light microscope. You can do it, and so now we do it very, very religiously, whereas we didn't do it before.

15 DR. UFFEN: Do I understand you to be saying, then, that tremolite may be every bit as much concern a crocidolite?

20 THE WITNESS: It certainly is in Cypress, because the tremolite was the only material found by Pooley, in three cases of mesothelioma. These women had never been off Cypress.

DR. UFFEN: And is this concerned primarily with mesothelioma - not with asbestosis?

THE WITNESS: Oh, no.

DR. UFFEN: Could I ask another question? This is just for my own education.

25 When you do the analysis, the normal type of analysis, and you are heating, what kind of temperatures do you raise the materials to?

THE WITNESS: Eleven and twelve hundred C, eleven to twelve hundred.

30 DR. UFFEN: And that's normal pathological process, is it?

5 THE WITNESS: No. Oh, no. No, that was the only way in which you could recover the material without the interference of the cells around it, and you see, if you just reduced it by, say, six hundred degrees centigrade, you aren't left...well, you were left with carbon. You had to get rid of the carbon.

DR. UFFEN: Well, the melting temperature of most of the silicates is of the order of a thousand degrees.

10 THE WITNESS: That's right, and you destroy them. You don't destroy them, you drive off the water -crystallization - and you are left with a rather weak silica-looking thing which you don't know what the heck it is.

DR. UFFEN: But you would also change the physical dimensions..

15 THE WITNESS: Oh, yes. You could no longer identify it by x-ray diffraction. There's no way you could do that In a finely divided state, certainly chrysotile is quite sensitive to heat, and we are talking about individual fibers.

DR. UFFEN: Because of the water in it?

20 THE WITNESS: Yes. It drives it off, and it collapses.

DR. UFFEN: So the lesson for me, I think, is to always inquire on how the pathologist has done his examination, what technique he has used, to find out whether exceedingly high temperatures have been used or not?

25 THE WITNESS: Well, I do not know whether normal pathological techniques in this country involve that kind of thing, but it certainly doesn't in Great Britain.

You see, the evidence by...can I develop this theme, or not?

30 DR. UFFEN: Yes.

MR. LASKIN: Sure.

THE WITNESS: The reason for doing this work originally came from the realization that the people who could make asbestos bodies were the people who were safe.

Asbestos bodies are synonymous with favorable cell reaction, that they have covered up, they have chelated the fiber bundle, they have put iron and protein around it and it doesn't migrate, and stays put.

We find there is no x-ray change and there is very little pleural change, and certainly very little physiological change in those people who adventitiously came to post mortem and we found masses and masses and masses of asbestos bodies. These were from heart failures and other things.

Whereas, the people who went on to develop typical fibrosis of the lung could not and did not develop asbestos bodies.

Now, the paradox came in that the pathologists who couldn't find asbestos bodies in their section, because they are very easy to see, certainly could not see these very finely-divided fibers because they were refractively the same as the glass he was looking at, and if he tried to use optical systems so that they could make them reactive, like cross polus, all this kind of tissue is very, very optically active, and so the birefringency of the fiber was lost. And so he would report that there was no cause or no industrial cause for this gross lung disease.

Well, the ridiculous part about it was that it was there, but he couldn't see it. And if he had seen it, then it wouldn't have caused the disease, because asbestos bodies do not cause disease, they are favorable.

So we had to remove and be able to demonstrate to these people, and I'm pleased to say that in three laboratories

5 THE WITNESS: (cont'd.) they now have low temperature ashing devices which they use continually, and so are able to see these very fine fibers under the light microscope, without the interference of tissue or anything else. There's only one way they can get there, but they are not contamination.

10 It removed so much of the ambiguity as to whether or not there was a so-called load in the lung.

15 A man can fall under a bus at eighty, and you'll find he is so chock-a-block with asbestos bodies that he could, you know, really...but he has no lung disease, and I'm quite sure that people who...and we have many in the Retired Employees Association, we have Lord knows how many people, over seven hundred of them, and I believe that these seven hundred are there because they could make asbestos bodies when they are exposed to asbestos, and that they have not suffered unduly from it.

20 But, I believe genetically there are people who cannot do this, and they are the ones who should be prevented, they are the ones who come up with disease, but I cannot help you as to how to pick them out. I don't know.

DR. UFFEN: Because that's obviously the next question.

THE WITNESS: Yes, I've tried.

25 There is a clue here - a rat cannot make asbestos bodies, a guinea pig can. If we could find out the reasons why a rat cannot make asbestos bodies and a guinea pig can, we might be able to transfer this one piece of information into the human side. But nobody has bothered to do it.

30 DR. UFFEN: Can a guinea pig make asbestos bodies in the life...how long does a guinea pig live?

THE WITNESS: For three years.

DR. UFFEN: Three years?

THE WITNESS: Oh, it makes them in the first five months of exposure. Oh, yes.

In fact, in the first week you can see the beginnings of deposition, where a rat never does. No one has succeeded in putting fiber into a rat or putting it in by insufflation, and getting asbestos bodies out.

DR. UFFEN: Well, the lifetime of the animal - the rat or the guinea pig - is long enough to do significant research on asbestos bodies, but what about cancers or tumors?

THE WITNESS: The life of the animal, in most researches, in fact in all researches, is put on one side of the equation, and on the other side the amount instilled into the animal, by whatever route, is modified up by literally a division of that length of time - say three years into seventy - so you get a twenty-five factor. So we put twenty-five times the amount in the animal that we would allow man to come up against, and it's absolutely ridiculous.

I mean, the challenge is so great that you are not dealing with the life of an animal, you are dealing with the life of a cell, and all cells in the same system live the same length of time, whether you've got an elephant or a shrew, and you shouldn't do it, it's wrong. You can produce asbestos bodies. That's easy.

DR. UFFEN: What I'm trying to understand, and you may have guessed this, is can we use animal experiments to give us advice about the illnesses which have a latency period longer than the normal lifetime of the animal.

THE WITNESS: I have entered into this contentious field for many years.

DR. UFFEN: You have or you haven't?

THE WITNESS: I have.

MR. LASKIN: He has.

DR. UFFEN: Okay.

5 THE WITNESS: And I feel very strongly about it.
I do not believe it. The animal has no translation back into
humans - none, none at all. It's whole structure is different.

MR. LASKIN: Q. Can you elaborate on that for us?

10 THE WITNESS: A. Well, the cells, first of all,
aren't the cells that we find. The airways are a different size,
so there is an automatic elutriation. The only thing that
is the same size are the alveoli - they are the same in an
elephant or, as I say, in man or a shrew. They are the final
culs de sac where the gas exchange takes place.

15 But the orinteeing of the fibers as they go
down - first of all, you have a horizontal lung in an
animal and you have a vertical lung in a human being - and it
is by no means of guesswork that the fiber that passed the
twelfth generation of the bronchial tree...and the twelfth
generation of the bronchial tree is where the ciliated
epithelia are...having got down past there, then they go down
20 by gravity, slipping and sliding throughout. They don't go
down in an airstream. They can't. It would be impossible -
except the very, very, very small ones.

25 The ore, the mother ore rock...now, when you
crush asbestos, as you know, you have two factors - you have
fiber and you have the prime rock from which it came, it is
chemically the same, but physically not. It is the thing
that gives miners pleural plaques, but not the textile worker
who doesn't encounter that kind of dust.

30 This will go down in a laminar stream. But
animals do not respond in this way, and because they cannot put
animals up to the same concentrations and the same challenge
that their cells would encounter if we put them in a factory...now

5 A. (cont'd.) if I put a half a dozen guinea pigs in a factory, and rats, and got permission from the government to do it, because after all it's insulting an animal and the animal can't...I haven't got a vivisection license, therefore I'm not allowed to do it. We can put human beings in it, but not animals, you follow.

10 If this was done without their knowledge and after three years most of them had died, well, they would have all died of pneumonia because we couldn't keep the place... but there was no sign whatsoever of any fiber in their lungs, none, couldn't find it, impossible.

15 So they have to, they create mills, grinding mills, they take asbestos and they grind it up, they put it in what they believe to be certain concentrations. I don't know how...well, I do know how they try and measure them.

20 At any rate, the animals are then left to snuggle up to each other and the whole thing is very unscientific, and so they say, well, we'll have to inject them. So there, they are injected. Or they implant. And that's really going from the sublime to the ridiculous. There is no way it can be done.

25 Animals can be used...I used animals for the testing of insulin when I was a young man. They are very good, I mean, after all they have a pancreas the same as we have, and it works the same way. But there are some things for which animals cannot and should not be used.

It isn't only me. I'm not a voice in the wilderness. There are loads of people. The Lancet carried, oh, about two years ago the Lancet carried a leader decrying the use of animals in such work as this.

30 DR. UFFEN: Did an editorial, or...?

THE WITNESS: An editorial by the Lancet...and it was not before time.

5 THE WITNESS: (cont'd.) I still regard John Davis as a very good friend of mine. I just cannot agree in terms with what he does, or the interpretation of what he does. He is the finest worker in this field there is, in his attention to detail, but when I think from what has happened over the past twenty-odd years, more than twenty years, and how it has benefited the man on the shop floor...there is no answer, nothing. No way can you determine whether or not there is a dose response by looking at animals in this way. It is not possible.

10 It wouldn't even do really to say look, we can confirm what happens in man because it happens in animals. Well, that's the wrong way around.

15 DR. UFFEN: Well, suppose we use an animal which is closer in physiology to a man?

THE WITNESS: That's right.

DR. UFFEN: Does your objection still hold...?

THE WITNESS: Oh, no. I know an animal which I wish would be used - a hog, a pig.

DR. UFFEN: Yes?

20 THE WITNESS: Yes.

DR. UFFEN: It's still horizontal. Would we have to teach them to walk on their...pardon my levity, but the more I look at this...

THE WITNESS: No, it's...

25 DR. UFFEN: I wasn't thinking of a pig, but that's...

THE WITNESS: It has the closest respiratory structure of any animal known, to the human being.

DR. UFFEN: I don't know this, but what's the approximate lifetime of a healthy pig? Is it...

30 THE WITNESS: Fourteen years.

DR. UFFEN: Fourteen years?

THE WITNESS: Yes.

DR. UFFEN: Would you get closer to the time
5 required?

THE WITNESS: What are you seeking to find out?
You see, I don't know...we haven't very much left to find out.
We know so much about this thing now. All we do not know, and
a pig won't tell us, is whether or not there is, in addition
10 to a predisposition towards cancer, whether or not some forms
of asbestos will bring this out - in other words, if you look
at a person's mother and father and the various..going back
two generations...and if you see there is no history whatsoever
as far as you can make out from demography, of cancer, then I
would say that's far more important than asking him if he smokes
15 or not, because I believe, and so do a lot of other people, that
there is a predisposition toward oncological manifestations if
it is there, if something is put there to trigger it off - in this
case asbestos. But if there is not this thing, then it doesn't
happen. And that is why we have no more...we do not have a
higher level of cancer in the asbestos industry than the man
20 in the street - it doesn't exist.

DR. UFFEN: You asked me a question as to why
would you want to do these experiments.

THE WITNESS: Yes.

DR. UFFEN: Or I think you said, 'what would
25 you try to find out'.

One of the things that has been posed to us a
number of times...which I'm not sure whether it is controversial
is the correct word for it...the importance of the shape and
size of asbestos fibers - length, the aspect ratio and the actual
size.

30 Now, it's very difficult, if not impossible, to
make observations about that on human beings.

THE WITNESS: That's all I do, most of the time. That takes up fifty percent of my work.

5 DR. UFFEN: Well, I better finish it. You are not able to subject human animals to deliberate experimentation with different sized particles, are you?

THE WITNESS: We have an enormous amount of evidence - far more than any animal. When they come to post mortem we know their exposure, what they were exposed to, the quantity, we know their respiratory function, we know how much they breathe every hour, at rest or at exercise, and then we have the evidence in the lung and the size and everything else about it.

10 DR. UFFEN: Do you know about the size distribution...

15 THE WITNESS: Yes, I do.

DR. UFFEN: ...on exposure?

THE WITNESS: A great lot.

DR. UFFEN: Would you like to tell us a little bit about how you measure this then, because we have had quite contradictory statements from various experts about the ability to measure.

20 THE WITNESS: You're going to get one more then, aren't you?

DR. UFFEN: Well, I'm inviting yours.

25 THE WITNESS: First of all, in 1960, we decided that we would have to measure fibers - both length and width - and although I was a member of the ARC - the Asbestos Research Council - at the time, I did not agree with their definition of a fiber.

30 Now, gentlemen, I have to tell you something which has to be said, and I don't think...whatever this furor or this cause is, it might as well come out here as anywhere else.

THE WITNESS: (cont'd.) In 1959, it was decided by the ARC - the Asbestos Research Council - in England, that it really wasn't much help in counting everything that one could see under a thousand magnification, because there was evidence, even at that stage, to suggest that it was the fibers that were doing the damage, not the hydrated magnesium silicate, as asbestos.

So you either came down on the side of the chemical school, or the mechanical school - indeed the fiber was doing the damage because of its mechanical activity in causing fibrosis.

Now, the only guidelines we had were from a chap named Gloynen Green at Saranack, from 1933, when he had done some wonderful work, beautiful work, and he recorded it in a paper.

They didn't use cameras in those days. He used a thing called a camera lucida, from which he drew them - beautifully accurate. And this paper described, and his opinion was at that stage, that the fiber doing the most damage was certainly of ten microns in length and above, and of a diameter not exceeding one and a half or perhaps two microns.

So, there was this single paper - it's in that book...you know that book I...

MR. LASKIN: Peters and Peters.

THE WITNESS: Pardon?

MR. LASKIN: Peters and Peters Bibliography.

THE WITNESS: Yes.

Now, we sat down and we decided that this was as good a yardstick as one could find, but one gentleman decided, and he did not foresee what it would do, he decided that we would be on the safe side and we would assume and count all fibers above five microns, and that's a definition of a fiber from

THE WITNESS: (cont'd.) a previous British standard - nothing to do with asbestos - a fiber was an elongated thing with a mensuration of at least three to one, a cylinder.

Well, all it did to me at the time was to make... was to give me the impression that we would have more work to do than would have been necessary had we stuck to ten, because later we found...and in fact this was universally found...we published a paper and I don't think I brought it and I don't know where it is now, it was all those years ago...but in carding and in spinning, and in all our activities, I do not know about asbestos cement, but in all the other activities which we have come in contact with the number of fibers of five to ten measurement in length, and of a suitable diameter, constitutes sixty-four to sixty-eight percent of all the fibers in the air, and there is a similar association between the eleven to twenties, the twenty-one to thirty, the thirty-one to fifteen. They are all associated, and we are getting sixty-two, twenty-one, ten, and I think nine. That's the way it goes, and it doesn't vary.

In fact, you could count one lot and assume the others, because it's in a concentrate.

You might think that this would have been upset by the various trauma that different machines give to the fiber, but it is not so. When you think of a shuttle coming back and forth in a weaving machine, it's clack, clack, clack, and that must break them up. But no, these are the same kind of values.

The only slight difference is that in carding you get a slightly larger number of longer fibers than you do as a proportion of the whole.

But, what we found when we started to do...I think by about 1965, 1966, when I had enough post mortem work to do a statistical analysis of it, we found that the diameter...I found

THE WITNESS: (cont'd.) the length of the fiber that was associated with...and I talk only about asbestosis, not about carcinoma...was seventeen and a half microns, up to eighteen microns - seventeen point five to eighteen microns.

In other words, provided there was not a carcinoma in the offing, provided that the lymphatics were still doing their job, the smaller fibers had been successfully removed or covered up. Nobody every saw, for example, nobody had ever seen, I don't think anyone has ever bothered to look or even notice the absence of a five micron asbestos body. They don't exist.

A ten micron asbestos body is virtually...we don't see them, because they have been removed. The only place you will find them is in the lymphatics where they got stuck over the years.

Here we are, spending enormous amounts of money because of a piece of unscientific guesswork on the part of a man who I have a lot of respect for - he's now dead anyway, but who did not realize what he had said in that brief sentence, because the United States took it up, you took it up, Germany, France took it up - five microns. It has no scientific basis whatsoever.

So I felt obliged, then, to contact a man named Henry Walton - you may have heard of him - and I asked him to put it into the Journal that this five microns...this is after Addingley had died, but he gave me permission to do so before he died...and I believe it would be either in this month's or next months' Journal of the Industrial Hygiene Association.

But there is no basis, no scientific basis whatsoever, for assuming a five-micron length.

DR. UFFEN: Then we should perhaps go smaller?

THE WITNESS: No, we go larger.

DR. UFFEN: Well, why not smaller? If you say there is no basis in five...

5 THE WITNESS: The five is too small to do damage. That's what I'm saying.

DR. UFFEN: Tell me how you measure this, then. There's more than one method of measurement, and what are the limits of observation of the different methods of measurement?

THE WITNESS: You mean in tissue or in air?

10 DR. UFFEN: In tissue, to begin with.

THE WITNESS: In tissue it's comparatively easy, because you then, having developed this thing that I was talking about, this low-temperature ashing, you then have only iron, which is particulate matter, and the residuals of...you could have a little glass, but you cannot produce glass with asbestos.

15 DR. UFFEN: What kind of microscope are you using?

THE WITNESS: Phase contrast, vibrating analysis and the polarizing microscope. All three are in...

DR. UFFEN: Are there any limitations on the small dimension that you can...

20 THE WITNESS: I can't see fibrils.

DR. UFFEN: You can't see fibrils?

THE WITNESS: They were not seen, ever, by anybody, until 1936.

25 DR. UFFEN: Wouldn't you use the transmission electron microscope?

THE WITNESS: No, I wouldn't.

DR. UFFEN: Why not?

THE WITNESS: It's going to be a long answer, do you mind?

30 DR. UFFEN: Well, I think it's important. If you are making very positive statements about there aren't any

DR. UFFEN: (cont'd.) present, and if you are using a measurement that can't see them, then the conclusion wouldn't be hard to understand.

But if you are using a method of observation, an electron microscope, that can see them, it might have more than one answer.

THE WITNESS: Right.

Two studies were performed by me in conjunction with a lady pathologist, Dr. Swinburne, who is on the Mesothelioma Panel in Great Britain. She provided me with two lots of a hundred lung and pleural samples, material, from people who died from any cause other than respiratory cause - any cause...old age, carcinoma of any other organ, but not a respiratory disease.

These, then, were ashed and looked at, and the parenchyma, the lung parenchyma, the lung tissue was looked at by a light microscope, and in every case we found asbestos bodies. That was to be expected. And in the pleurae under electron microscopy we found masses and masses and masses of individual fibrils. There was no pathology, nothing. These people had no...they had nothing wrong with them at all as far as their lungs went. This was the result of living in the twentieth century, due to the ubiquity of asbestos fiber... which is present in this room as you probably know, I'm sure you know...and which we all breathe and come to terms with.

There is a very adequate host, kind of host/fiber relationship, and it splits up. Because we are presumably fit and well, we have a lot of surfactant which wets out this fiber, it breaks it down into submicroscopic sizes, into fibrils, and they slowly but surely wander away from the hilum, and they wander away into the pleura, and there is nothing wrong. There is no thickness, nothing. And these people were seventy,

THE WITNESS: (cont'd.) and eighty and ninety years of age, and had this fiber in them a hell of a long time - no pathology.

5 Therefore, I suggest to you, sir, that the electron microscope, when it is used for this kind of investigation, is a sledgehammer. You don't need it. It fools you, because when an asbestos fiber like this splits up into individual fibrils, there is not a whit of evidence to suggest that it is in any way
10 pathologic - none.

The size of the material that does the damage is that which can be seen under the light microscope at around about five to six hundred diameters, or even a thousand if you want - the bundles of fiber, the presence of which does not exist in atmosphere like this. You can differentiate between
15 three things - you can differentiate between the size of the fiber that went down before 1952, and that was before the mines here were asked to fine it down, and you can see the other kind of fiber which the men started to breathe after they got this opened-up fiber, and there is the other kind of fiber which you get from the man or woman who lives in this world, and they are
20 very, very fine indeed. They have been split by the action, rain and whatnot.

DR. UFFEN: I've kind of intruded into your line of reasoning, do you mind?

MR. LASKIN: No, not at all, Dr. Uffen.

25 DR. UFFEN: Perhaps others can help me, because my memory isn't all that good, but we had testimony before us, as you are probably not aware of, that the reason for the five micron figure was that that is approximately the limit of the phase contrast microscope.

30 Does anybody remember whether...wasn't that from Ontario Research Foundation, Dr...

DR. DUPRE Chatfield.

DR. UFFEN: Chatfield.

5 THE WITNESS: Well, I'm afraid you have been misled. I'm the only one living, I suppose, now, who was in the room at the time the five micron was chosen. That was long before any dust measurements were done in this country, or in this hemisphere. And moreover, if you can't see anything smaller than a five-micron sized fiber with your microscope, then either you should leave or the microscope should be replaced.

10 DR. UFFEN: It wasn't just a question of seeing it. It was the reliability of the count.

THE WITNESS: There is no question, no question. If you want to be sure, to be sure it's four and a half, should you include it if it's four point five microns, or is it five, then that's a tortuous thing to do, it really is.

15 DR. UFFEN: Suppose it's two?

THE WITNESS: Well, if you cannot determine something which is half the size of the smallest thing you have been told to look for, then the mark one eyeball is becoming useless to you. I'm sorry...

20 DR. UFFEN: I agree with that all right, but my problem is, can you reliably make counts with the phase contrast microscope, of say two microns in length?

THE WITNESS: Oh, yes.

25 We have devices...I dare say that you have them in Canada...called image splitters. They split the image up so that you can determine the diameter.

30 Say you've got a thing that long, but you want to see what in there, and you can split it up like that, and you can bring it together and make it pass through itself. Having done that once or twice, you are then able to divide...or the computer does it for you...and you will arrive at the diameter.

Now, we are talking about half-micron diameters,

THE WITNESS: (cont'd.) which is half.

It's phase contrast, no question.

5 DR. UFFEN: Is that used normally in the NIOSH or the international membrane filter method?

THE WITNESS: No. No, no.

DR. UFFEN: So it's not a practice used except, say, in specialized research?

10 THE WITNESS: This is a routine. We do it as a routine.

The United States' method of counting fibers has been, since I first met it in 1961, a travesty, and it still is.

DR. UFFEN: Counsel, would you like to elaborate?

15 THE WITNESS: No, I don't think so. I don't think it's really worth going over. I suppose I'm a bit...it's like a mother, I invented this method myself, I brought it about, and I do not like seeing it abused by various people who believe they can do better, because there is only one answer to proper counting, and that's diligence and experience. You cannot devise methods whereby you can take people off the street and say, look, you've got a week to do this in.

20 It takes months and months and months before...you don't need graticules, you don't need special filters. You need to know what you are looking at and you need a jolly good mentor for some time, and the only way to do this is to have the big transverse microscope with two sets of eyepieces - one there and one there - and you are both looking at the same thing, and you both come to...and this student comes to agreement with his mentor that that, he agrees, is counted or not counted. And that takes months and months and months, but when it's done, it's done. It doesn't have to be done again. But they don't do it. They look at pictures in a book.

30 DR. UFFEN: We've been shown lots of them.

THE WITNESS: Pardon: You've been what?

5 DR. UFFEN: We've been shown many...several times the pictures with the fibrils and so on, and we've had all kinds of testimony on the membrane filter method, and it's...

THE WITNESS: Well, I'm sure there are many, many manuals telling you how to drive a motor car, but I wouldn't like to be a passenger with a driver who is going to get in a car for the first time, having learned how to drive from a book.

10 No, sir. You need experience, and you've got to go on and on and on, because you have mixtures of various things that are not asbestos, and they can mimic.

There is no way I can explain it to you.

15 DR. UFFEN: Well, may I...do you mind my pursuing this?

MR. LASKIN: No, no.

DR. UFFEN: We've had people talk to us about intercalibration with laboratories. I would like to hear your views on whether that was a sound and reliable process.

20 THE WITNESS: Well, I have taken part, and the laboratory in which I work has taken part in I don't know how many, I've just lost count. Either they were nationally things within laboratories within the nation, or they were international, and I have to say that where there was agreement, it was merely fortuitous, that's all.

25 When you are dealing with such very, very small values, to start wandering to the right of the decimal point is playing make believe. You cannot do it. It isn't possible.

30 However much you count, normally you count so many fields and then if you know, you must know, how many fields there are in the total area of the filter, then you multiply by that to get the total area. Then you know how much air has gone through, it's easy.

5 THE WITNESS: (cont'd.) Well, this huge sum that you multiply by - sixty thousand - it just serves to exacerbate a mistake whereby one fiber is accepted or not, particularly when you've only got about six fibers in the whole thing, because of the type of counts we are running up against now.

So you say, increase the amount of air, so you get more fiber on the filter, therefore it would be more accurate.

10 Well, if you increase the fiber, you increase the detritus, so you have a masking effect and you can't see the things at all then, so you are really stuck with this one.

DR. UFFEN: Now, you have recommended the short-time measurement with the increased speed of the pump...I can't think of the right word. Why would you recommend it, then, if all the detritus is accumulating, too?

15 THE WITNESS: Who did?

DR. UFFEN: Oh, maybe, let me see now, recommend is maybe the wrong word, but I'm looking at this document, number six, which we found very valuable, and on page twenty-four you are comparing four-hour samples and the traditional eight-hour sampling, and then there are some...one of the other papers refers to five-minute samples, I think. I'll have a look for it, and I'll find it.

20 But the question has come up before of whether to make the measurement more reliable we should just step up the pumps a bit and push the air through so that there are more fibers to count.

25 Now, you've suggested that that isn't going to be too successful.

THE WITNESS: You can do it that much easier. You can reduce the size of the filter. Reduce the size of the filter. It would be much easier. And keep the same pump.

30 See, the velocity is increased because you've got

THE WITNESS: (cont'd.) a smaller area for it to go through.

DR. UFFEN: Yes.

THE WITNESS: I mean, you've got the same effect. Exactly the same. You can do either, one way or the other, it doesn't matter which. But, you are going to arrive at the same thing. But if you are dealing with a mixed dust, you are going to get masking of it.

DR. UFFEN: Well, how should we decide what is the optimum size of filter or the optimum time over which to average the measurement?

THE WITNESS: By trial and error. By looking at the job. It varies for every occupation. It varies for the man.

You can get a man who is a mucky worker. He will slap things down and create dust.

You can get another chap doing exactly the same job and he's somewhat more careful. Now, this chap is going to make life very difficult for you, and it's no use telling him, oh, you must do it more gently - do it like him. He won't do it.

So you know his name, you know his number, you know his position, and you work out...we used the Royco, first of all, to do this. We've got a machine that will count fifty times, a thousand times faster than we can, and we find out the total dust coming off a chap like this in so-many minutes, and then we work out how much of this is...we know how much, because there are built-in membrane filters within the Royco. We know what the display is, we take the membrane filter out, and we count it for fiber and we say, well, if we sample this chap for, say, ten minutes at so-and-so speed, we will then have the optimum amount per field. That makes life easier for us, and it's all marked off in the records...individual machines, and so on and so

THE WITNESS: (cont'd.) forth.

So there is no golden rule for this. None that you could apply.

DR. UFFEN: Then we have a fundamental difficulty then. Regulators, people who set regulations, set them in terms of measurements of so-many fibers per centimeter or milliliter.

Are you telling me, then, that those regulations aren't going to be meaningful for everybody? That that's the wrong way to go about it?

THE WITNESS: I'm sorry. If you are referring to a...these are not...see, in Britain we don't have legislation like this. We have recommendations. There is no...there is never any quantity put into a document, an instrument, because if that is passed by parliament it will take ten years to change it, and that's ridiculous. So we only have recommendations, which are not included in any instrument whatsoever.

But where the recommendations are...for example, it has not been recommended, and eventually I suppose it will come into being, that we have one fiber per mil.

Now, that isn't overkill. I don't think anyone argues about it, it's quite ridiculous. It's very expensive, but it has to be done. It's merely a political thing to satisfy the unions. It certainly isn't...there is no evidence to support it from an epidemiological point of view.

In the event that is a one, now how you sample is dependent upon what the process is that you are doing it with. It doesn't alter the fact that recommendations are one, and one it will be. How you do it is up to you. All roads lead to Samarkand...if you are doing it properly.

DR. UFFEN: Just a minute. This is what's bothering me. Can I read this little statement to you? It's the second paragraph from the top, on the righthand side:

5 DR. UFFEN: (cont'd.) "An example of a four-hour sample, giving a final concentration of one and a half fibers per cubic centimeter, as a result of assuming a continuous dust emission and dividing the total fiber count by two hundred and forty times the volume, was actually found to be twenty-five fibers per cubic centimeter, caused by a fifteen-minute emission, with little or nothing for the remaining three and three-quarter hours".

10 THE WITNESS: That's right.

15 DR. UFFEN: Now what this says to me, that it's crucial to know how long the measurement is being carried out. A time-averaged measurement over...as I read this...is over four hours, did not reveal that the exposure had been fifty times the value.

20 Now...I'm not trying to debate with you, I'm trying to find out from you whether there are failings in our present methods of measurement and regulations, and that we should not set regulations on the assumption that there is a measurement technique with a certain reliability, if the reliability doesn't exist.

THE WITNESS: Oh, I agree.

25 Unfortunately, at the moment, so much has been concentrated on....especially by the CRL - that's the Central Reference Laboratory - of which I am a member, but it's all on the counting technique. Nobody bothers about the sampling, and really if the sampling is in error, why bother to count it?

But sampling is difficult.

30 Now, there is a much fuller paper on that statement. You've got a copy of it.

DR. UFFEN: I think so. It's either seven or eight. I forget which one.

THE WITNESS: This thing. Have you got that?

DR. UFFEN: What's the title?

5 THE WITNESS: "Sampling and Counting Asbestos
Fiber on Filter Membrane - Strategies Thereof."

MR. LASKIN: Tab seven.

DR. UFFEN: Tab seven, yes.

10 THE WITNESS: Now, I went into some detail there,
and I am at the moment, I am developing a sampling device which
would overcome this, and it is a device, a personal sampler,
which shifts around a membrane so that eight segments are
separately sampled. It's worked by a window going around, and
it is pressure-controlled by very, very small transducers.

15 So you can tell for every half or quarter of an
hour, however you set the clock mechanism that pulls the thing
round, as to what the concentration was at that time.

But in the middle it's like a keyhole. You've got
a hole with a segment. That is being exposed all the time - so
you can see the total exposure - and the various segments going
on. Then you know.

20 Because often in this case, all that would have
been literally the same as this segment because there would have
been nothing further on. At least you can tell then.

25 Because I believe, and I've strongly believed over
the years, that peaks are very important. The challenge peaks
are of vital importance to the cells of the lung, and if you can
average that out through a day, then really the thing is
misleading, very misleading.

DR. UFFEN: Could you tell us why you believe that?

30 THE WITNESS: Yes. It stems from looking at people
who have died. I believe I tried to write it up, and I apologize
for saying this, but I tried to write it up in such a manner as
to be understood by people who weren't acquainted with it, and

THE WITNESS: (cont'd.) that is, why some people produce asbestos bodies and some do not.

Yes, that one.

DR. UFFEN: The histiocytes.

THE WITNESS: Yes.

DR. UFFEN: I'm not sure which tab it is.

His particular ones don't have the tab numbers written on it, so I can't refer to it.

We are laymen - or I am anyway. Could you take a minute or two and explain it, if you can?

THE WITNESS: Sure.

DR. UFFEN: To those of us who don't have medical training.

THE WITNESS: Well, I had to come to some form of reason, a few years ago, as to why in a person who died of asbestosis, without any other complications - right-sided heart enlargement, corpulmonale, you know, the things that one expects, gross fibrosis - why there were some bodies floating about. Not a lot, but some, and the rest was one enormous mish-mash of asbestos, just nude asbestos fiber.

Now, added to this was the fact that in many of these cases they had been away from exposure for many, many, many years...I'm talking about twenty years since they were last exposed...and now they were dead. So this fiber had remained as fiber, uncovered, in their lung, for all these years, doing damage.

But they weren't asbestos bodies. They were bodies that were chelated by protein and iron. This is from ferritin and the attempts of phagocytes to engulf them, and they leave a kind of slime on them like a snail does, you know, and it goes on growing, and finally it involves the whole thing.

Now, why were they there? Now, why were they

THE WITNESS: (cont'd.) formed and yet subsequently nothing?

5 It became apparent, and I suppose this is...this was even confirmed many years later by some animal work, which I suppose I should be grateful for.

10 Now, where the challenge was so hyper, where it was so profound that the overwhelming of the histiocytes or phagocytes was achieved in a comparatively short time, that the subsequent family and daughter cells of all these things were deficient either in motility or even the DNA, the RNA message, to do its job, and they packed up working and that would explain not only why, in the case of these people who died with enormous quantities of fiber which were completely untouched, they also had other material which should have been cleared from the lungs, which should not have been there, in the normal course of living.

15 I'm sure you appreciate, in every mill there's about three hundred thousand particles below point three of a micron - in every mill. And that is all adequately dealt with, normally.

20 But where the transport system is destroyed or partially destroyed, then there is trouble. And I believe by looking at men and women who have spent various times in the industry, or died after various times in the industry, it became apparent that after a year or so, if the challenge was so great or that their predisposition towards it was so great, either one, that they were no longer able to contain this overwhelming amount of fiber, and they just left it.

25 Now, the danger was and still is, that people to whom this happens also cannot accommodate one fiber per mil...the present standard. I mean, the present standard...you know, I once said to somebody who wanted to know what does one fiber a mil look like, and I said, well, look, do you see this?

5 THE WITNESS: (cont'd.) I said, the law allows
you to have a million fibers, because that's a cubic meter and
there are a million mils in a cubic meter. There are a million
asbestos fibers that are allowed, and you start thinking in terms
of how many cubic meters have we got in here, and how many cubic
meters you breathe, and you soon come to the conclusion, if you
want to be that way affected, that one fiber per mil is an
enormous number of fibers that you are going to breathe either in
10 a year or two years.

But if your lungs are...if your histiocytes are
working well, then you can accommodate them easily enough because
the evidence is we can't even find them in people who have
adventitious death. The suicides and the accidents are very
valuable, because we all learn a lot from them.

15 DR. UFFEN: May I interrupt here to make sure I
understand?

THE WITNESS: Yes.

DR. UFFEN: Do I understand you to say then, that
if a person has been exposed inadvertently to a very heavy
20 concentration...

THE WITNESS: Yes.

DR. UFFEN: ...for a short period of time...

THE WITNESS: Not so short.

DR. UFFEN: All right. For a sufficient length
of time...

25 THE WITNESS: A period, yes.

DR. UFFEN: ...to damage their lungs, that they
subsequently are more susceptible to asbestos-related disease?

THE WITNESS: They are unable to deal adequately
with any further incoming challenge. Yes, that's what I'm saying.

30 DR. UFFEN: Now, if this happened to a person in
the first year of their employment...

THE WITNESS: That's right.

DR. UFFEN: ...it would be unknown?

5 THE WITNESS: That's right. It's quite occult. The occultism of this is the confusing part, but I don't know about Canada, but certainly there can be very, very few places in Great Britain now where such a challenge would exist.

10 DR. UFFEN: Well, we...I'm not sure whether you encounter it...but we encounter this most frequently in either the construction or the demolition industry.

THE WITNESS: Yes, I would agree there.

DR. UFFEN: Where inadvertently someone may get exposed for a short period of time to very large dust counts, dust counts that are so large you can see the dust.

15 THE WITNESS: Well, the dust you can see will never enter the lungs, but I agree that where there is dust you can see.

DR. UFFEN: But the dust you can see will never enter the lungs?

20 THE WITNESS: No, because if you can see it, it's too big.

DR. UFFEN: But in dust there will be a particle distribution...some...

THE WITNESS: Yes, but it's the dust you can't see that's the damaging one, not the stuff you can.

25 DR. UFFEN: But it's still there.

THE WITNESS: Yes, but you didn't say that. You said, there's so much I can see it. You can't.

30 DR. UFFEN: I'll say it now...in fact, I'll put it in personal terms, if I may. I worked in a shop years ago where we could tell whether the situation was inadequate or not, by looking at the sunlight coming through the factory window. And we knew that if we could see the dust, that the people who

DR. UFFEN: (cont'd.) came and measured it would subsequently tell us that it was too much.

5 Now, we saw only the light reflected from the particles which were big enough to do it, but the distribution was such that the smaller particles were usually there, too, and you have been telling us something very similar.

THE WITNESS: That's right.

10 DR. UFFEN: So it is important if you can see the dust.

THE WITNESS: In which industry?

DR. UFFEN: I would think in the mining industry, in the insulation industry...I have not worked in textiles, but I would see no real reason why it wouldn't be important if you could see the dust in the textile industry also.

15 THE WITNESS: From a nuisance value only. Not from the pneumoconiosis point of view.

You take the manmade fiber industry. Years and years ago people used to complain, working with glass fiber, look at the sun, look at the stuff there.

20 But you see, a glass fiber is a filament. It can't be split any further, and although this stuff looked terrible, not one piece was able to negotiate the bronchial tree.

25 It just...it looked bad, it was emotionally bad, but it was in no way hazardous. It might give you a sore throat. That's all.

When dust is small enough to be seen, it looks blue. It provides a diffraction grating in that particular spectrum, and if you see a blue haze like tobacco smoke, you know that is risky.

30 But that's the only kind you have, and I do not argue with you, sir. Where there is dust you can see, there is

THE WITNESS: (cont'd.) in all probability, in this case, dust you can't see.

And anyway, the Clean Air Act of 1894 said that no man should work with dust in the atmosphere. So by the sheer mechanics, he shouldn't be there.

DR. UFFEN: I'm afraid we don't have quite the Clean Air Act as you may have.

THE WITNESS: Well, I mean we have it, but how often is it observed.

DR. UFFEN: I didn't want this to degenerate into an after-lunch conversation, which we might very well have, but the implication of some of the things you've said are rather important to many of the principles we've been dealing with.

Now, I would like to return for a minute to one of the things you just made, a statement you made which seemed very important to me, that you are developing or have developed, I'm not sure which, a membrane filter technique which could give measurements of both short-time interval and the longer-time interval?

THE WITNESS: Yes. It's called a sequential sampler.

DR. UFFEN: Sequential sampler. At what stage of development is this? Is it commercially available, or is it in the research stage, or...?

THE WITNESS: I made four. I employed an electronics man who was on vacation from university, to make four.

We've run up against snags, but we have all the wherewithall to repair the snags, if you like. But it's not... I would be quite willing...if somebody else would take it off my hands, because I'm getting fed up with it.

All I know is that it would work with enough

5 THE WITNESS: (cont'd.) attention being paid to
it, but I would gladly send all the drawings and everything else
to you. I'm...I would like to see somebody either put a lot more
time into it, or a bit more money, than I have, and then get it
off the ground, because I do not believe that the membrane
sampler, as we know it, is anything more than a misleading way
of doing things, unless you have alongside the man a time and
motion study...literally, a time-and-motion-study person...who
10 is looking and recording...I say, ten minute by ten minute as
to what he is doing and where he is going.

If you know what he is doing, then you can
equate his actions with the value you see on a total circle,
or on a total membrane.

15 Now, if...you see, four hour, I do not know of
a job, quite frankly...except in the textile works...where a
card can...well, I don't think a carding machine will work four
hours without stopping...certainly a frame won't. I mean, you
won't weave a piece of cloth for four hours...I don't know of
any job, quite frankly, that takes four hours, and so you gear
20 your sampling to the work cycle. The motion of the friction
material is less than seven minutes, so this is how you do it.
You sample for seven.

25 And the other way...and it's laborious and it's
costly...is to replace the filter every half an hour in the
man's...here you've got one running all the time, here you've got
one where you take it out and replace it every half an hour, so
that you have eight samples from here, as against one from here,
and that's where you find these differences.

30 DR. UFFEN: This sounds so appealing to me, what
you are describing, I can't quite understand why there hasn't
been a clamor in the United Kingdom to do the research and
development on this.

5 THE WITNESS: I will tell you why, sir. It is because when the inspectorate...I have many friends in the inspectorate...but when they come around and they bring their thousands or hundreds of sampling devices, they go round and they hang them on the various people and take their names, and by the time they have hung so many on so many people, it's time to collect them again. It's like the Forth Bridge, by the time they've hung it on the last person, it's time to collect the first one. They haven't any time to attend to what have you been doing, has the machine been working all the time, or did you go out to the loo, or where have you been.

10 All the instructions are, I suppose, is don't touch it, don't switch it off...not where he should go and where he shouldn't do.

15 They go into certain areas to smoke, and they are puffing away for I don't know how long - as long as they can get away with, I suppose - and they are nowhere near asbestos, and yet we assume that they are.

20 DR. UFFEN: Well, we used to go into the dust room to smoke because nobody could see that we were smoking.

THE WITNESS: I'm aware. They can smell it, though.

But really, these are designated places where men can go, and there's a breakdown of machinery...

25 DR. UFFEN: You made a very good point about the...observing the work procedure. But what about the technical aspects of your instrument? This sounds to me like it's a patentable instrument. Have you applied for a patent?

30 THE WITNESS: No. No. It was paid for, first of all...I got a thousand pounds, two thousand dollars, about, to buy tools to press out a fan. There's a little fan I made, in a housing, because I wanted this to work without valves, without

5 THE WITNESS: (cont'd.) pumps, without anything, and it was working off a Swiss S-cap motor...a lovely little motor with silver bearings to it, and it's a kind of motor you would use for a shutter in a camera, a weeny one, but with great torque, enormous torque. You couldn't hold a spindle when it was going, and it was only about that big.

10 So these were the things we built-in to this thing, and this fan provided enough draft...you know, we are talking about an eight-micron four-size diameter...you see, eight microns will trap five-micron fibers.

DR. UFFEN: Most of the time.

THE WITNESS: If you back an eight-micron filter with a one-micron filter, you don't get anything on the one.

DR. UFFEN: All right.

15 THE WITNESS: Even if you put a space between them. It's quite useless, it's quite wrong to use filters with such small diameters, because then you need big engines to pull against the drop, the enormous pressure drop, of course.

20 So even that...people, I suppose I'm the same, people only tend to adopt methods that they have thought of themselves.

Anyway, that's my theory.

25 DR. UFFEN: Well, let me assure you I'm a real exception. I'm listening to something that you have done research and development on that sounds like the ingredients for a portable instrument that could be worn by a workman...

THE WITNESS: I think so.

DR. UFFEN: ...it's small, portable.

THE WITNESS: No tubes, nothing.

DR. UFFEN: It's probably expensive.

30 THE WITNESS: No. We were going to put it up at forty pounds - eighty dollars. That was then. That was the cost of the raw materials. It's about that big. A bit bigger

THE WITNESS: (cont'd.) than the size of a package of cigarettes.

5 DR. UFFEN: So as not to use up too much time on this, I would like to accept his invitation....

THE WITNESS: I'll send it to you.

DR. UFFEN: ...to send us the material.

THE WITNESS: Yes, certainly.

MR. LASKIN: By all means.

10 THE WITNESS: I should be very grateful if somebody put it...I'm afraid I got a little bit blase about it because the kind of values that we are now being asked to look at, one fiber per mil, I would have to increase the size of the engine, because at one fiber per mil, at this rate, you would never see them. You know, I rather...but for situations where
15 you are going to get substantially more than this, or where there is going to be a difference in a time factor where you need sequential sampling, I don't know of anything else because there is not one on the market. And it all works on transducers.

20 You see, the more dust you get onto a filter, the more difficult it's going to be for the engine to draw the air through, so you have a transducer that tells the engine, speed up. So you have a constant pressure.

DR. UFFEN: A variable flow.

25 THE WITNESS: No, the flow is the same. The flow doesn't alter, because if you block up the holes of a filter and you want to keep the flow going the same way, you have to speed the engine up. That's what this does.

DR. UFFEN: All right.

Have you written it up or published it...

30 THE WITNESS: Ah, it's written up. I'm not publishing because I never went on to really...I would like very much for somebody else...maybe someone can improve on it, I don't know.

5 THE WITNESS: (cont'd.) But fundamentally, it is a sequential sampler with a self-regulating flow mechanism, very small, with replaceable batteries or rechargeable batteries, whichever, but it hasn't got any tubes all over the shop.

People get apprehensive when you start hanging tubes on them. They don't like it. I don't really like it either.

No, you can have it. Certainly.

MR. LASKIN: Well, we would be grateful.

10 THE WITNESS: Please.

I mean, the last thing I thought of was somebody....I didn't even intend to speak about it, but the last thing I thought of was somebody might like to look at it and perhaps take it on to the finish. That would be very nice.

15 DR. DUPRE: Can I suggest that we give our witness and ourselves a break at this point, and resume at 11:20?

MR. LASKIN: Sure.

THE INQUIRY RECESSED

- - - - -

20 THE INQUIRY RESUMED

DR. DUPRE: May we resume, then, at this point.

Dr. Uffen, would you wish to pursue a question?

25 DR. UFFEN: Yes. I would like to ask Mr. Hunt if he could return to the topic we had earlier this morning about the ventilating systems of plants that are using asbestos, and tell us if he has any suggestions as to the best way to ventilate a plant.

30 THE WITNESS: Ah. First of all, I am not by calling or by education...well, say I am not a physicist, it's true. I am not a physicist, and neither am I an engineer, but by dint of using various devices for measuring the, either total dust of fiber, and so involve the engineer to such a point as

5 THE WITNESS: (cont'd.) it becomes part of his discipline too...we make them look down the microscope...we don't 'make' them, we ask them to...we describe what we are seeing, we describe what he would see if he did so-and-so and so-and-so, or get him to suggest what he could do to improve it, and we'll also have these machines, these Royco machines, in which he can see for himself immediately whether he has created an improvement - he doesn't have to wait any time for it.

10 Also, we have...I don't say educated...we have got the environmental engineers involved in fallout mechanisms, as to how far away and with what velocity, or negative velocity, should be applied to machines which give off kinetic energy to the dust. There are many machines that just produce dust, with little or no energy, and they can be fairly easily captured.
15 But where you have got to overcome that energy imparted to the dust, then you have to use other methods, and this really becomes not a matter of putting a bigger fan in - you can go on putting fans in bigger and bigger and bigger, that doesn't do the job - you have to make the uptake, the thing nearest the workpiece, designed...you need a tinsmith, for a start, he is an important
20 man in this, and he designs a thing that will go near a grinding machine or a drill, or the fishtails over a loom or a card, and they are...most of these have been enclosed by devices, glass and wood, all the cards are enclosed, all the carding machines are enclosed.

25 DR. UFFEN: But during the recess you mentioned a plant, I believe, where you had been able to achieve very considerable success by recirculating the air? Am I right?

THE WITNESS: Yes.

DR. UFFEN: Would you like to describe it?

30 THE WITNESS: Well, it all started off with the cost of coal. It's a heck of a price to pay - it's going up and

5 THE WITNESS: (cont'd.) up and up and up, and we felt there must be some way, other than just throwing heat out of the vents and through the bags, you know, and out...that's very expensive.

10 So we sat down and we talked to one particular engineer and we suggested that we could recirculate this air if we could...what was the word...guarantee, I suppose, or fit such a failsafe device to it that the H and SE engineers, the health and safety executive people, could not fault it, because certainly you cannot recirculate dust-laden air, that's all.

DR. UFFEN: You shouldn't. You can, but you shouldn't.

THE WITNESS: Yes, I'm sorry. You shouldn't.

DR. UFFEN: Okay.

15 THE WITNESS: We then decided to adopt the same principles as are arbitrarily adopted for the checking out of vacuum cleaners.

20 Obviously, a vacuum cleaner has to be used in asbestos, has to be so constructed so that the effluent air that comes out the back certainly will not augment the dust already in the air, it would only serve to dilute it because it, itself, is virtually free of fiber.

25 But there is no...there isn't, I suppose there could be, but there is no electronic device that we have bothered with that you can put on the exhaust vent of vacuum cleaners, that will start ringing bells and doing other funny things if indeed the filter started to let fiber through, but this is exactly what we have had to do and have done in this system.

30 We are passing through a seven-and-a-half-thousand cubic foot a minute times fifteen...

DR. UFFEN: A hundred and five.

5 THE WITNESS: ...so we get up into a hundred and twenty thousand cubic foot of...this is on one set of cards alone, and there's all the other things that are exhausted...and it comes out at nearly three hundred thousand cubic foot a minute, and that's a lot of air to throw away.

But then it's passed through filters, primary and secondary in nature, and before it is allowed to go, it, itself, has implemental oxygen put in it, and...

10 DR. UFFEN: Excuse me. Oxygen introduced?

THE WITNESS: Yes.

DR. UFFEN: From, like bottled oxygen...

THE WITNESS: Yes.

DR. UFFEN:...or just more air?

THE WITNESS: No, oxygen.

15 DR. UFFEN: Bottled oxygen?

THE WITNESS: Yes. That is not our experience, but it has been the experience of plenty of people that when they continue to recirculate air, of course the CO²...well, you know.

DR. UFFEN: Yes.

20 THE WITNESS: But my prime role in this was to be able to satisfy, and prove indeed, to the government engineers that we were not contravening the law...the law, I suppose...in this regard of recirculation of dusty air, and these Royco machines...you see, many years before we had the first Royco machine, we asked for and got the first Royco machine...

25 DR. UFFEN: Is this what's called the Royco Particle Counter, in the paper?

THE WITNESS: Counter, that's right. Yes.

30 But having got...the Royco Particle Counter is really a very sophisticated tyndall beam, where it sees individual fibers which feed the message through a pulsate discriminator, and this then, the amount of light which comes off the total...

5 THE WITNESS: (cont'd.) because in all the ends, really of a fiber you...is then seen by a photomultiplier, goes through a pulsate discriminator, and then you can select what sizes you are looking at, and so on and so forth.

DR. UFFEN: It measures all particles, not just...?

THE WITNESS: Oh, it can't discriminate. No.

DR. UFFEN: It can't discriminate?

10 THE WITNESS: Oh, no. No.

There is a counter, as you may have heard of it, it is supposed to be able to discriminate, but we find that it doesn't work very well.

We did not spend the money, we merely borrowed one, and we couldn't make it do what the manufacturers claimed.

15 But the point is this, sir. If you are an engineer and you have been asked to do something about a piece of apparatus which is dusty, you are going to set your, construct a piece of negative suction equipment, and you are not concerned with the various components of the dust. You are dealing with a total dust situation. You can't remove fiber and leave the
20 spherical material behind.

Now...and especially this Royco machine is looking at total dust...but at the same time, we incorporate filter membranes into the air circulated through this thing, so you have a readout of the thing. These days, you have little computers in them as
25 well, and then you can count, say, two or three hundred membranes that have been in this thing, and you've now got the readout.

You say, well, from the fiber count, yes, it looks like the total dust count is so much, and if you do that long enough, you will have a tieup, a genuine tieup between the fiber contents...but it takes a long time.

30 These, then, were put in, and before the air is

5 THE WITNESS: (cont'd.) returned to the factory, it has to pass these sensors, and there are eight of them in this particular process, and if any dust...if the concentration rises more than point zero two of a fiber per mil, it's what it was set at, then all kinds of things happen.

10 The first thing that happens is, it is repeated. Everything stops and it is repeated, because there can be an electric flip which would do this, and it is then repeated a third time. It only takes about three minutes all together.

15 Then, should it so be that there's a genuine, in some way, at the moment we don't know, in some way that there is a genuine escape of dust somewhere that is going to be let back into the factory...oh, dear! We've got ancillary equipment for this.

First of all the bells ring, or the alarm rings, alarm rings in the engineer's office, and at night time it rings in his house, which is about three miles away.

20 Then it shuts off. It opens up the vent for incoming air and shuts off the recirculation. But it must do this gradually, because in the winter time if you bring in cold air, freezing air, it will block up the filters with ice so you can't let that happen. So you have to bring it in slowly.

25 Then, by our panel, you can see which sensor picked it up, so then the engineer goes to the sensor and he then takes an individual...we can channel this, bring it right out and look and see just what is happening, without the other seven...the other seven are not involved.

30 Now, to make sure that this is continually well, we have, as I say, membranes in this thing that are taken out every day, but also we are able to inject with a syringe a quantity of inert dust at a point several yards away, several meters away, and we want to see the reading come up on the machine within a

5 THE WITNESS: (cont'd.) given time, which is a time computed from the flow of air up it during the screening, which... and when you have done all this, you have a set up which you really can save an awful lot of coal.

It cost half a million pounds...

DR. UFFEN: They cost a half a million pounds?

THE WITNESS: Yes.

DR. UFFEN: For this...?

10 THE WITNESS: Yes, but that was then. It would cost a million now, I suppose. You know, I'm talking about then. Seven, eight years ago.

DR. UFFEN: The whole ventilating system, or just the particle counter?

15 THE WITNESS: No, no.

DR. UFFEN: The whole...

THE WITNESS: The whole ventilating system.

DR. UFFEN: Now, could you tell me what kind of a plant you are speaking about?

THE WITNESS: A textile plant.

20 DR. UFFEN: A textile plant?

THE WITNESS: Yes.

DR. UFFEN: And what fiber level are you able to maintain with this system?

THE WITNESS: You mean in the factory?

25 DR. UFFEN: In the factory. What's your experience been? Can you keep it at one fiber...

THE WITNESS: Oh, lower than that.

DR. UFFEN: ...point one?

THE WITNESS: Lower than that.

DR. UFFEN: Lower than point one?

30 THE WITNESS: No, lower than one. Not point one. There is no one that I know is going to accurately measure point

THE WITNESS: (cont'd.) one anyway, so I'm talking about...you see, I don't go beyond the righthand side of the decimal. I think it's a waste of time. It's only guesswork.

DR. UFFEN: We were told yesterday that you could measure to point zero three. I'm afraid I wasn't convinced, but...

THE WITNESS: Well, I'm sorry, in which case, then, whoever it is, come and work for me.

DR. UFFEN: How far below one fiber per cc, per milliliter, can you get with this system?

THE WITNESS: We are running at one and below, and I'm not...I mean, I'm sorry, I won't enter into a discussion, really, if you don't mind, on what kind of values we get below one fiber, because it is such a subjective thing, it is so subjective, but as far as another Royco machine...that is, a battery of Royco machines not only in the system but on the shop floor, looking at dust, then we are talking about one, one point two. That's total dust.

DR. UFFEN: And the asbestos fiber content?

THE WITNESS: About half.

DR. UFFEN: About half?

THE WITNESS: Yes. That's taking upwards of a thousand liters through an enormous membrane.

DR. UFFEN: Even in the wintertime?

THE WITNESS: In the wintertime it's even better.

DR. UFFEN: Why?

THE WITNESS: Because there aren't the number of windows open. The windows are all shut and the recirculation is pure. You aren't getting any air from outside at all.

DR. UFFEN: Take more oxygen?

THE WITNESS: I'm afraid you would have to ask the engineer. I think it's possible, yes.

DR. UFFEN: Is there available a report, publicly

DR. UFFEN: (cont'd.) available, on the situation you have been describing, that this Commission could have?

THE WITNESS: Yes. I know that if...you see, what we have done, we have invited anybody and everybody, the world and his wife can come and see this thing. We are proud of it, we want people to see what we've done, and the thing is, without going through the stages of development, it's there.

I mean, you would do a lot worse than to get the chap who designed it over here. He is the finest environmental engineer I have ever come across.

DR. DUPRE: What is his name?

THE WITNESS: His name is Robert Jackson, and I don't think he has a peer either in the government or in the asbestos industry.

This would never have been done without him, never.

DR. DUPRE: You mentioned a report in answer to Dr. Uffen's question. Can we count on you to send us that...

THE WITNESS: I'm sorry?

DR. DUPRE: You mentioned a report in answer to Dr. Uffen's question.

THE WITNESS: About what?

DR. UFFEN: About the operation of this particular textile plant.

THE WITNESS: Yes, yes.

DR. UFFEN: Can we count on you to send it, or should we do something more to make sure that we get it?

THE WITNESS: Well, I think it would be...I do not presume to even suggest to you gentlemen the proper way to go about things. I am very bad at doing things the proper way, but I can only suggest that a letter written to the managing director of Scandura would give him great honor, and he would see

THE WITNESS: (cont'd.) you got it. Rather than I...I am not employed by Scandura. I am an advisor.

DR. UFFEN: That's exactly what we want to know.

THE WITNESS: What?

DR. UFFEN: How to go about getting it.

THE WITNESS: Well, his name is Wittle

DR. UFFEN: Whittle?

DR. UFFEN: Mr. Ronald Wittle, W I...the same name as the chap who invented the jet engine...Wittle, and he is the M/D of Scandura.

DR. DUPRE: Mr. Laskin?

MR. LASKIN: Q. Mr. Hunt, can we just change the topic again, and let me ask you about one of the topics which prompted us to invite you here, amongst others, and it really relates to the whole question of nonoccupational exposure.

We have heard some evidence over the past year, year and a half, relating to persons who are not occupationally exposed to asbestos, who have contracted mesothelioma, and I am sure you are familiar with some of the studies, which at least purport to say that.

THE WITNESS: A. Oh, yes.

Q. It has been suggested to us that as a result of studies like Wagner's in South Africa, that some of these mesotheliomas were contracted by persons who had minimal exposure to asbestos, trivial doses of asbestos, and when Mr. Davis was good enough to be here as an expert witness, he in fact suggested that you had supervised or personally conducted certain experiments of your own to try to assess what the exposure levels were to, for example, spouses of people working with asbestos...who might have to deal with the clothes of asbestos workers, in the home, and so on.

Then I look in your publications and I look at

5 Q. (cont'd.) the very last page in tab eight, which appears to be a note of a report to the Asbestos Research Council, and I wonder whether you could help us on this whole area.

10 A. Well, I think I could do a lot worse than to start by saying that in many, many respects the amphiboles, and let us say crocidolite - leave the amosite out of it - crocidolite and chrysotile have two things in common, and only two things. One is they are silicates, and the other is they come out of the ground.

15 Having said that, I think they are as different as chalk and cheese in so many respects. The one thing we are concerned with here is the discrete way in which crocidolite will repeatedly aerosol itself, given that there is enough force to get it up into the air, and it will remain as an individual fiber bundle rather than a conglomerate or an accretion of fibers which occur when the same thing happens with chrysotile.

20 When chrysotile is allowed to settle out on any horizontal surface - or vertical surface - then to reaerosol it is impossible.

25 Now, I put it to you not as a form of proof, but the only proof you can have from me is that under the microscope we know we can't do it, but you have people like Davis and Wagner and countless other people who spend many, many thousands of pounds on milling machines to create asbestos dust that they can call respirable, to put into animal cages.

30 We, Turners and Tate, I suppose, at the BBA, we throw away vast quantities, tons of the stuff, of dust, every week - dust that has been taken out. Most of it, or a large fraction of it, is respirable, but it will never be of any good to these people because you cannot...once one asbestos fiber or chrysotile fiber comes up against another one, it joins and it

5 A. (cont'd.) stays joined. It also joins up to any other piece of dust it can find. It has a remarkable affinity for being gregarious.

10 But, this does not happen with the amphibole. The amphibole can be, and this is where the work came in, that if you sweep it up and you attach simple membrane devices to the handle of the broom, you soon find out that you are getting countable, respirable fractioned fiber entities. Whereas with chrysotile, you don't get it. You might get one or two, but very, very seldom, because they have all joined up and criss-crossed each other.

15 The same thing happens when it's a shed from clothing, too. If you take clothing and you simulate...you take a room about eight foot cube, nine foot cube, a bit like a small kitchen, and you start patting yourself, having contaminated the clothing, either the contamination was through gross contamination by artificially doing it - by chucking asbestos on you, sir - or it was genuinely put there by airborne asbestos, one of the two.

20 In the event...it didn't make any difference, crocidolite fiber that came off was in quantities - this is where I can...have you had Timbrell here?

Q. No.

25 A. Now, he has found it. I don't agree with Timbrell in the half of what he does, or even three-quarters, but in this we have a point of agreement, that he became aware that children who had come to post mortem, say at the age of fourteen or even earlier, and were children of asbestos textile workers in the crocidolite side of it, revealed on post mortem such quantities of asbestos as to make you wonder how...I mean, they had more in them than normally you would find in a person who worked with asbestos for a long time, and this really must
30 have come about by the patency of the airways, the hyperventilation

5 A. (cont'd.) of the children and the concentration within the kitchen, because it was accumulative...as the days went on it got worse and worse and worse because they haven't got exhaust systems in the kitchens.

But chrysotile just didn't matter anymore. It became flocculated and was of no consequence. The slightest amount of water on chrysotile destroys it for all time for ever being respirable.

10 Crocidolite will dry out and again become respirable.

These are great differences here, and this we found - we found that when we did this work with clothing, we got upwards of ten to fifteen fibers, or started off with fiber, because it gets worse and worse and worse as you go on.

15 Then it did not then become a mystery as to how these enormous concentrations were put into the lung of these children whose history we know - we know what happened to their parents and we know when they left, and so on and so forth, and now the range is up to three and a half years, as I recall, that was the maximum length of time that their parents were working in the industry - that was the total length of time they were bringing home contaminated clothing, in other words. One was only one year.

20 But knowing this only made it more apparent how very, very dangerous it was to liberate crocidolite within a household.

25 So we went further than this. We went down an old coal mine and we liberated crocidolite. It was never going to be used again, but we got the draft going and we liberated crocidolite in a coal mine. As far as I know, it's still going now.

30 But this is the kind of thing it is. It's so different, and this is why, you know, the advent or the discovery

5 A. (cont'd.) of crocidolite in buildings, either
of a public or private nature, should be dealt with...well, it
can't be dealt with too soon, but I would deplore the fact of
removal. This is a dreadful thing. This is really exacerbation,
because there are plenty of substances especially developed to
be adsorbed into the crystal lattice of asbestos, not just into
the fibrils by capillary attraction, but into the lattice itself,
10 and in the form of paints, and once it's put on that's a sealant
for all time.

You know, it really is very efficient, but to
start chopping it up, that's terrible.

15 DR. UFFEN: Is there any evidence, to your knowledge,
anywhere as to whether the same thing applies to amosite or
tremolite as to the crocidolite?

20 THE WITNESS: Well, sir, tremolite is not
used in a quantity sufficient, really, to warrant investigation.
It is a constituent of very good talc. Tremolite exists in talc,
as I'm sure you know, and it also exists to a greater or lesser
degree in the Canadian chrysotile, and when we became aware of
its existence, it then became apparent from the people who count
asbestos that they had been seeing tremolite for years and years
and years, and they merely thought of it as rather curious
straight chrysotile.

25 But the fact that they had found it and had...I
mean, from then on...I think it was about three years ago, it
was certainly before this zeolite thing happened in Turkey, so
I think it was four years ago...I used to be called up on the
internal phone - look, come and look at this, what do you think
of this.

30 So what we did, we decided to use dispersion
staining, which is a device for looking at the refractive index
of these things - the refractive index of tremolite is away, away

A. (cont'd.) different from that of chrysotile, but not so different from crocidolite, and it was easy to pick up.

5 As there was no crocidolite in the factory, the only amphibole could be tremolite, and it was established that it was there.

10 It became rather difficult, and a lot of guesswork as to put it as a percentage or a fraction of the whole, because it rather depended upon the amount of fiber. I mean, you are working to a one fiber standard and counting a hundred fields, so the chances of finding a tremolite fiber were just not...so we began to take much larger quantities and we found that around about one in every six hundred thousand fibers - I call it half a million just to round it out - would most likely be a tremolite fiber, and that's a lot.

15 But it varies. It varies between the types of air.

We had some...you know when you people went on strike here and we couldn't get Canadian chrysotile, we had to get it from Russia, I had lots of it there...and the Italian stuff, there was a lot of it.

20 So what I'm saying is that if we have, and I believe we have to use asbestos, we better get it from here because it seems to have a far, far smaller quantity of tremolite in it than the other stuff.

25 But I'm afraid the other stuff contaminated the factory. Now, I don't believe we've got rid of it yet. It's a pity, but I don't know of any...I don't know if Pooley can do this. Pooley might, perhaps, be able to identify tremolite that comes from one part as opposed to another. I don't know if he can do that.

In the end, this is what we found.

30 Q. Just to come back to your clothing experiments, when did you do them?

A. Thirteen years ago. Twelve, thirteen years.

Q. Did you do many of them, or over a sustained period?

A. We did a lot of sweeping. What we wanted to show, we wanted to point out to the government that their wording should be not that vacuum cleaners have to be used, but that any method of sweeping, any method of cleaning, should not bring about a fiber content greater than that which would be if you used a vacuum cleaner.

I think it was wrong to force people...in other words, if they could dump the whole lot down, they could sweep it, and there are various kinds of sands and things you can sprinkle on it. But if they used them, and used them properly, they said yes, they agreed, and this is the way it was put.

But, how would I discipline people, sweepers, and this is another thing - by definition sweepers are either old men or young boys, and old men really don't take kindly to doing, you know, to instructions, and they did not believe...I agree with them here...that if you told an old man he had to use so much water and do this, that and the other, he would start off, but eventually he would just walk around with his broom and just gaze into space.

I've seen old men use vacuum cleaners and the things haven't even been plugged in, and they are gaily waving them about. This is wrong, because I believe people who are assigned to clean up places should be young, active people who are being paid a decent salary to do the work.

But somehow, I haven't yet managed to put that across.

Q. But that was the purpose of these tests?

A. Yes, to demonstrate initially that indeed, sweeping up chrysotile didn't give rise to a thing.

Q. All right. When...

5 A. Then we go on to housekeeping. You know, I can't argue that the better the housekeeping, the less liable there is to be respirable fiber, and the best housekeeping will certainly be achieved by the use of one of the many, many vacuum cleaner systems - either things you plug in to an already-existing vacuum system, or the individual ones - provided the filtration system is okay.

10 Q. What exposure levels did you get when you were doing experiments with crocidolite?

15 A. Again, you have to think of the kinetics of it. If you swept up rather slowly, you didn't even produce a great deal, and actually it depended upon the position of the filter, the membrane filter - where it was on the broom handle. So we decided that the obvious place to put it was as high up as possible, as near as the operator's breathing zone, because certainly if you put it down on the broom head you would get much of an artificial amount. So we put it nearly at the top.

20 Now, then, I think I will have to send you this thing properly, because it was done out...but I didn't have all this time to get all this stuff together, you know. I hope you understand this.

25 We got between three and twenty, I think, three and eighteen fibers per mil, depending upon what vigor you swept with. This was the only thing about having old men sweeping up. You know, they didn't produce a great cloud of dust because they did it so slowly, so that was a benefit in a way. But, you know, that's a very poor reason for using old men.

30 I suppose I shall probably come to it myself one day, and I shall use the broom very slowly as well, but even so, the amount of crocidolite was untenable, and it was an eyeopener, too.

5 A. (cont'd.) Shortly afterwards we went on, as I said, to the clothing shed, and it happened...I can tell you this much, that the first evidence that I had...there have been others, but it came to me...was from a firm called Roberts, in Leeds, who used crocidolite asbestos purely for reinforcing a plastic substance, and they eventually gave rise to nearly all the mesothelioma that existed in Leeds, from ex-Roberts workers, but also, unfortunately, they managed to bring about these pleural tumors in people who never worked there.

10 This, I believe, is an opening for the time for me to say that there is no evidence whatsoever, nor do I find any evidence, valid evidence, from anybody else, when you look at it, that an environmental hazard exists from the use of asbestos.

15 The dilution, the air dilution factor is so great that the amount of fiber that you would have to initially put up would exhaust resources in the earth. You can work it out quite easily on a blackboard.

20 You think of a five mile an hour wind, say a kilometer high. Think of the volume. In that volume, and well over convection currents, you have to have a fiber content at least of one fiber per mil. 'Struth, I mean if we say that one fiber....I mean, you work out the specific gravity, work out the weight you would need. It is an enormous quantity, fantastic, tons and tons of it. And it won't happen.

25 We have now a resident population who lived around this factory where I work, who lived there before 1930 - that's before any filtration system was set up, the stuff was just vented into atmosphere, all of it. There was no law that said you couldn't do it.

30 In 1932, they had to filter it, according to the government.

5 A. (cont'd.) Well, so now we have people who have lived at least fifty years having been subjected to these enormous...well, relatively enormous quantities, and not the slightest sign of damage to any one of them.

And because they had either they, or some connection with the works, I appealed for autopsy work to be done on many of them - nothing.

10 Now, these people were living within ten meters of a process plant. They weren't living there, they were living in houses. They lived outside.

15 When we came, in the later stages, to use things called Litton Samplers...has anyone spoken to you about Litton Samplers...then we get the kind of figures we know to be true, and they are commensurate with the kind of loads you find in the lungs.

20 I cannot see...I myself have stood at traffic lights, I have stood on junctions with samplers, looking at people squealing their brakes and clutches, and I cannot find it. And I do not believe it exists, because if it existed, we should have seen it.

25 Somewhere along the line, somebody hasn't done their homework. Somebody has been assuming too much. When they started to suggest that mesotheliomata can be caused, and indeed are the outcome of people who have never, ever come into contact with asbestos in a kind of commercial way, that they are just there. I've never seen it.

Q. How do you then explain the spouses of asbestos workers? Do you include that in...?

30 A. No, I don't, no. They are then...the concentrations that we found and would be in the kitchens are far greater than you find in the factory - enormous. And it's there, literally, forever because it can't get out.

Q. And if it's crocidolite, on your evidence, it keeps recirculating?

A. That's right.

Q. It becomes airborne over and over again?

A. Yes.

Now, we used to have a cottage industry - in fact many people did - they would get people to take...they have small looms at home and they'll weave asbestos at home. They would make gloves and home, and all this kind of thing.

DR. UFFEN: Could I ask a question here? Would this decidedly different behaviour between chrysotile and crocidolite, did you go to your colleagues and related people to see if there was any explanation for this quite different behaviour?

THE WITNESS: Oh, I know the explanation. It's not very far to go.

DR. UFFEN: Well, what is it?

THE WITNESS: Well, chrysotile...you know that it is normally a weavable fiber when it's soft, and it has, when you look under a reasonably-decent high power, you have the bundles which have little groups of smaller bundles jutting out there. It cleaves, it cleaves very readily. Not so, amphibole. They remain very much like glass fiber, and there is nothing to keep the one against the other, provided...there is only one way you can do this, and this to impart on deionized air...if you deionize the air, as we tried, then you can get crocidolite to stick to each other. But you don't get that in normal practice.

DR. UFFEN: Have you discussed this with physicists, with people who might have gone into greater detail as to the physics of why one particle will cleave to another?

THE WITNESS: Yes, I have been. I have discussed

THE WITNESS: (cont'd.) it with people at Porton?
Have you come across anybody from Porton (phonetic) yet?

DR. UFFEN: From where?

THE WITNESS: Porton. It's a government research place. It primarily was used for producing poison gasses. So then they decided not to make any more poison gasses...at least they said they didn't...and a lot of the research faculty was taken over for dusts and toxic substances.

I went down there. They have some very nice material. Of course, they have got some very clever people, too, but they've got some nice material down there, a way of testing things.

We were looking for the charge, you see.

DR. UFFEN: Yes.

THE WITNESS: Now, from the information we got...

DR. UFFEN: The electric charge?

THE WITNESS: Yes. Mmm-hmm.

DR. UFFEN: I'm just making sure that that goes into the record, because it isn't clear to everybody. You and I may understand we are talking about electrical charges, but others may not.

THE WITNESS: Well, you know, we've mentioned it a number of times.

Unfortunately, with chrysotile it can either have... it carries a negative charge or a positive charge, and on occasions they have found a different charge at each end of these fiber bundles.

Now, this is one of the things that precludes, completely precludes, static filtration. You can't use it. It bridges all the time, you know, and you cannot use the anti-static on this, so you use the conventional thing called weirs.

But with crocidolite, they seem to repel each other.

THE WITNESS: (cont'd.) There seems to be a function whereby, although you find them...oh, dear...I have to go on to something else.

Has anybody ever spoken to you of microholography?

DR. UFFEN: I know what it is, but we have not had it spoken about here at our hearings.

THE WITNESS: The most delightful and sophisticated method of looking at dust you ever saw in your life. You take a photograph of it.

DR. UFFEN: Tell us about it.

THE WITNESS: Oh, it's lovely. It was first of all done...it was first of all carried out for a firm who wanted to look at a bronchodilator which was being impelled into the lungs by use of a small impeller, and they wanted to look and see just how discrete these particles were.

They got hold of a chap from Edinburgh, who eventually published his work in Stope - the journal - and what he does, he takes a photograph at around about six hundred diameters, using a conventional laser, and the dust...the photograph, of course, when you then project it with a laser, you can actually walk around the other side and look at it. It's rather fun, because the dust is all then...it doesn't appear as an artifact. When you look under a microscope, it's all flat. That's never the way it was. The nearer thing to this is Royco, who does at least see it an airstream, but when you use this kind of method you can see the proximity of one dust to another.

DR. UFFEN: It allows a three-dimensional view rather than a two-dimensional view.

THE WITNESS: Yes. Very nice. You can really look at the orientation of dust then.

It's a bit slow, you know. I don't think you

THE WITNESS: (cont'd.) could ever use it for a routine method, but it's a delightful thing to do.

5 Anyway, we looked at crocidolite like this, and really you just didn't see particles in conjunction with each other. They just remained separate.

DR. UFFEN: Has this been reported in the scientific literature in a way that we could retrieve it and have a look at it?

10 THE WITNESS: I feel I should do, but I haven't done so yet. There is so much I should do.

DR. UFFEN: Has anyone else?

THE WITNESS: Oh, I have reported this to the ARC, yes. Many times.

15 You see...and oh, by the way, as a result, you see, of a lot of this work, we get the people in Edinburgh to do it, and there is a chap named Dr. Vincent, who has been doing the work on electrical charges on fibers and the results of these things, at Edinburgh.

20 I don't know what state his latest publication is in, but you've nothing to lose by asking him. Or I could ask when I get back.

I don't mind disseminating the idea. It's the trouble it takes to publish the work.

25 But that is a fact. There is no gainsaying that, you know, it is one of its chief physical differences. Not only is it iron instead of magnesium, not only has it no water...because it hasn't, as opposed to chrysotile, in its crystal lattice, but also it keeps itself to itself.

30 You know, if you put four or five or ten or twelve clutch facings into a plastic bag and you shake it up, you produce an enormous amount of dust, and incredible amount, very respirable, and it's asbestos.

5 THE WITNESS: (cont'd.) But you put a small piece of cotton wool, dry, into the bottom of that bag, you don't get any. Because if you circulate it long enough, the cotton wool, it all sticks to the cotton wool. It just loves to join up with itself - that's chrysotile.

You put cotton wool in the bag and shake it up with crocidolite...you are wasting your time.

10 MR. LASKIN: Q. Where does amosite fit in all of that?

THE WITNESS: A. I don't bother with amosite, you see. I'm sorry. Amosite, to me, is a nonstarter. I can give you no evidence whatsoever...I've sat on a BOHS thing in 1965 or 1966, to try and work out an amosite level which we would...which would be satisfactory.

15 The evidence was so sparse, because there was nobody, as far as we know, in Great Britain, who had got an amosite-only exposure for a start. And anyway, there was so little of it being used, other than by Cape in their maranite (phonetic) boards, and they were due to stop that anyway, and not make them anymore.

20 So I don't know who...it's a bit like anthophyllite. Nobody uses anthophyllite except the research worker, who uses anthophyllite because it produces these lovely asbestos bodies in his animals. But we don't use it in industry, and I fail to see the point in using it anywhere, because it's a completely different fiber.

25 But all this work that comes out of Finland about pleural plaques, yes, it's true, but it didn't come from the fiber.

Q. Is the work of Timbrell, that you spoke of earlier, do you know whether that's published work or not?

30 A. This was at Cardiff, I think year before last. He gave a paper on the long-term effect of housebound

A. (cont'd.) crocidolite, and it's as I have described it to you.

5 But his was a completely different series and it was many years after mine. I did mine, oh, about 1970.

Q. And he was looking at children?

A. He was, yes. Well, what became of it. Not of children per se, but the adults who were children who were exposed through their parents' clothing.

10 Q. Do you have any opinion on whether or not children are more susceptible or more at risk?

A. Ah, well, I think that the sheer dictates of the physiological aspect of it must prevail insofar as if you have an already-systemed system like the mesothelium, in the, say, a twenty year old, to which the only changes now would be replacement changes, those cells will be replaced as they die, and so on and so forth.

15 But in children, where the whole system is one of growth, I suggest...and it's not only in this system, but other systems, too...that the interference of a growing system by a challenge such as this, which is really forever...once it's there, it's never going to leave...it's a terrible thing to happen...and I think I mentioned briefly in passing last night, we do a lot of work for various government concerns - hospitals who want us to look at asbestos in their makeup, you know, and in schools, swimming baths, and anywhere - and I have told these people, where money is short in point of fact, that when they want a school looking at, for fiber, they do not have to think about the price. There will be...we only make a small charge to cover all that we do...but there would be no charge. I wouldn't want to think that their coffers were empty and they wouldn't have the work done.

20
25
30 I feel that way because of the association of

5 A. (cont'd.) mesothelioma with such sparse quantities that I can recover, of crocidolite, from their lungs.

It only serves to teach me, I suppose, or to point out to me, just how little is needed to trigger off a system like this.

10 You see, it's irreversible. There's not a thing anyone can do. Nothing. It's a shame. It's a rotten way to die, as well.

15 Q. I'm just trying to place that comment you just made in the context of the experiments you did with clothing and so on, because as I listen to your description and read your description in the material, of those experiments, what you are telling me is that you were getting exposures that were at least as great as occupational exposures?

15 A. Prodigious, yes.

20 Q. I concluded from that, perhaps wrongly, that what you were suggesting was that the mesotheliomas that have been observed in spouses of asbestos workers indeed haven't been caused by trivial exposures, but have been caused by exposures which are equivalent or greater than occupational exposures?

A. No, I'm not saying that.

Q. You are not saying that?

A. Oh, by no means. I would say the opposite.

Q. You would?

25 A. Yes. But, I have never seen crocidolite in the thousand cubic foot samples that we take of urban air, I have never seen crocidolite. I have never seen an amphibole in it. Chrysotile and glass, yes.

But when you consider the amount of amphibole, the crocidolite that is being used, it is just nothing.

30 We are having to deal with a system that was, not with a system that is. But I don't see that we will see the end

5 A. (cont'd.) of the peak of mesothelioma until about 1995, maybe the year 2000. We are peaking now, like hell. We are getting so many mesotheliomas now it's frightening, but it is no more than we expected. But this is not the result of urban contamination. This is a result of contact.

10 Q. But how...is what you are telling us that for mesotheliomas that a very small amount of crocidolite, in your judgement and observation of cases in the past, may be sufficient to induce it?

A. Yes.

15 Q. And may be..and children, you are telling us, are more at risk because their mesothelium is...

A. They've got lots of risk too, yes.

20 For three things they are at risk. One is that their airways are more open, two is the fact that they are growing, and three is they have got long to live. All those things contribute, in fact, to their greater risk than the likes of you and me.

25 Q. Their airways are more open?

A. Yes.

30 Q. Physiologically speaking?

A. Yes.

Q. And their mesothelioma...

A. Their mesothelium.

35 Q. Is developing, growing?

A. Yes, right.

Q. So it's more susceptible to insult?

40 A. You are interfering with the blocks of growth.

45 Q. Thirdly, because they have longer to live, it is more likely to develop during their lifetime?

A. Yes.

5 DR. UFFEN: Could I ask about the relationship of tremolite to this conversation? Is there any evidence or knowledge that would put, say the tremolite, in a similar category as the crocidolite?

THE WITNESS: I don't know how much proof he found. I guess it must have been enough for him to identify in these women.

10 DR. UFFEN: Perhaps if I tell you why I'm asking this it may be easier for you to...talcum powder is used on babies' bums, okay, at a very early age, in kitchens, and if tremolite is in that talcum powder and has been misidentified because people didn't know how to identify it properly under the optical microscope, the phase contrast microscope, is there
15 a possibility that we've got a whole raft of people who have been exposed to potential mesotheliomas because of the use of talcum powder carelessly?

20 THE WITNESS: Well, I could answer that from my own experience. We did a further...after these post mortems we did fifty or sixty-odd, sixty-odd, a series of sixty women, of hysterectomies and/or removal for ovarian tumor, and we asked this material because the very use of talc as a cosmetic can find its way into many places.

25 Now, we found birefringent material in all of them. It was all there. Whether or not there was tumor, this is the important thing. The majority were without tumor, but they all had birefringent material, but it was not, repeat not fibrous. It was platy.

30 Whatever fibers had been present had been carted off. One saving grace of talcum powder, sir, is that the fiber content - whether it be tremolite or whether it be chrysotile - it's so small as none of it, none of the samples that I've seen,

5 THE WITNESS: (cont'd.) represent a challenge to the histiocytes, provided you aren't going to take enormous... they can all be carted away. There is nothing over about six microns, seven microns, and that's easily handled by the...and the cells, the cells in and around the ovaries and the vagina, are far, far more active than any cells in the lungs and they were more than able to deal with it.

10 I think it was quite wrong at the time for certain people...well, the Hamiltons of this world, I suppose, to publish papers suggesting that talc was the cause of ovarian carcinoma, because they didn't look at women who had no carcinoma but who had also the presence of talc in them and there was no effect.

15 So I mean, the study was not a good one.

But talc is...ah, we had talcosis before the war, but that was a different substance altogether, before we started using forms of plastic.

I mean, the people who made records, they had a nasty time of it because they had a lot of deaths through that.

20 DR. UFFEN: What is talcosis? Like asbestosis?

THE WITNESS: Yes. Talcosis...have you never heard of that?

DR. UFFEN: No, but I've got a sudden personal interest because I spent a lot of time during the war dealing with rubber and cables.

25 THE WITNESS: Ah, yes. That's where a lot of talcosis occurred, in the rubber industry. But hang on, you can recognize a case of talcosis when you get it up on the x-ray. Oh, it's quite different. It's not all that malignant anyway, but it certainly presents a most amazing picture. It looks as though there's noway this man can breath - look at the shadowing
30 on his lungs - and it quite rapidly disappears after you leave

THE WITNESS: (cont'd.) the talc, this platy material. It all of a sudden disappears and it's taken up.

But at the time, it looks dreadful.

But they did decide to give it an 'osis' - talcosis.

MR. LASKIN: Q. Mr. Hunt, can I...I'm sorry to pursue this, but it's an important issue for our Commission...I wanted to come back to this question of the relationship between crocidolite and mesothelioma in households...of asbestos workers.

If you are telling me from your experiments that the levels of exposure that have been found, that likely were found, likely existed in households, were equivalent to occupational exposures, where is the evidence, then, that crocidolite in very small amounts is sufficient to cause mesothelioma?

THE WITNESS: A. Because of the post mortem studies we've made...hundreds of them. And in many we can find no...despite the repeated examination - not of the same preparation, but going back to get more and more lung and after ashing it - but I can say...

Q. But did you find any crocidolite?

A. Oh, yes. It's a bit like...if I could divert... it's a bit like tuberculosis. If you have somebody who has tuberculosis, or is suspected, and you get some sputum from him, if you find the bacillus - no argument, there is the thing. There is no argument what it is...I'm talking about it because I used to do a lot of this work, but if you don't find it, it's not to say he hasn't got it. You've got to go looking until you do find it, and it would never, ever be sure...if you never find it, you can't be sure that he hasn't got tuberculosis, and finally...so if you can never find the crocidolite, it's not to say it isn't there, but the suspicions are and the evidence is that when you find mesothelioma about which there is no argument - these weren't endotheliomas, they weren't other

5 A. (cont'd.) malignant tumors, they are mesotheliomas - and in the other lung...you can't look at the lung...you know, you don't by that sort of...you look at this lung and there's not much of this lung to look at, and it's diluted with tumor...so you take this one because although in most human beings the angles at which the two main bronchii come off are slightly different - they are never quite the same - it is reasonable to assume that there is not a preferred path, so you look at the dust in the other lung.

10 Quite frankly, you can get...it depends how long the exposure was, but the evidence is this - that if you have enormous quantities of crocidolite in the lung, resulting in a mesothelioma, this is misleading, because we have found three-month exposures...these are people in the same factory as these children died - the parents were in the factory - three months exposure, two 15 months exposure, many at six months, all dying of mesothelioma, and the amount I could get out of these people was very, very small indeed - very small.

20 No, I'm left with no other conclusion that provided there is a predisposition towards oncology, a predisposition in some way, and that there is a minimum amount sufficient to cause something to happen, then off we go. I cannot explain the dwell time nor has anybody else, for that matter.

25 But if I had to put it in a nutshell, I should say that the concentration, the acceptable concentration of crocidolite, is nil. Not point one, not point anything. Nil.

Still, I don't have to prove a negative here as I do in other things. I don't have to ask to do the impossible.

DR. UFFEN: Could I ask a question right here? Is there any other cause of mesothelioma than crocidolite exposure?

30 THE WITNESS: Well, quite recently we've got this volcanic zeolite in this little village in Turkey...but it's not only in Turkey, it's to be found in other parts of the world now...

5 THE WITNESS: (cont'd.) this zeolite, fibrous zeolite used for building houses, and they have been living with this thing for hundreds of years and they've just almost accepted mesothelioma as a way of life.

MR. LASKIN: Q. What about chrysotile? Do you accept that chrysotile alone can cause mesothelioma?

10 THE WITNESS: A. Well, if chrysotile, if chrysotile alone - not the tremolite, chrysotile - can be held responsible for the development of a pleural tumor, then why is it that we cannot find it in the pleura, and in the good pleura, the pleura that has not developed a tumor? Crocidolite, yes. But not chrysotile.

15 Also, when you think of the amount or the proportion of mesotheliomata that develops from known exposure to crocidolite, then we should have enormous numbers - just by simple calculation - of mesothelioma in chrysotile-exposed workers. But we didn't get it.

20 Something happened around about 1950. The..I mean, the miners in Ontario...in Quebec, rather...showed little or no signs of parenchymal damage from the mining of asbestos, up to a certain point, where it was literally blowing out of the ground and was put up in sacks...it might have been a bit crushed, but most of all the crushing was done back in Britain, or by the customer.

25 Now, now when the miners are then...when the system really is changed and they become exposed to similar dimensions to which they are exposed in Great Britain or wherever, then you see parenchymal damage now starting up. You've got similar pictures.

30 But because they became inured - they didn't wear masks, they didn't take any precautions, nobody ever said it was even necessary - it probably wasn't, until they altered the system, the winnowing system, and then it became necessary.

5 A. (cont'd.) But how much, how many men...it wasn't an English chap, it was Cartier. Do you remember Dr. Cartier? Does anyone know of him?

Q. I think we've heard the name.

10 A. Well, he was the Quebec mining man who went on to say that before long you will be seeing a similar situation in the mines as what you are getting in the textile and the process workers, and the further you go along the line the more liable you are to get disease. In fact, the highest concentrations of lung disease, asbestos-related disease, exists in packers, and they are people who are packing the final stage.

15 Now, they are displacing air by putting something containing asbestos into a box, and up it comes. At that stage, the final stage, you've got a very finely-divided fiber that has been through weaving, spinning, all the rest of it.

20 Now, as far as the other studies, I can't come to terms with them, quite frankly, because there's a paper just written. Sweden have just recently published a paper in Thorax, this month I think, on nonmesothelium pleural tumors.

25 These are in people who...eight hundred and forty were studied - eight hundred and forty - of asbestos-exposed people, but they were not mesotheliomas. I would suggest, knowing the way that some of the United States people go about some of their work, that these are not mesotheliomas. I can't say more than that.

30 I mean, Selikoff will certainly blind you with science if he can. But when you really look into it, you find that he has left the work to other people, he has left the work to other people who finally, when it comes to who did this work, it wasn't very well done.

Q. So that...but I take it your conclusion is, from your own work and your own examination of other studies,

Q. (cont'd.) is that chrysotile alone, pure chrysotile, does not cause mesothelioma. Would you go that far?

5 A. Oh, yes. I would go that far. Because in none, in none of the people - and I've looked at eight hundred and something now, getting on for a thousand anyway - mesotheliomata, in looking at them, I hope diligently, I have not found one without amphibole.

10 Now, this is a negative way of doing it, but I need to find one where I can see no amphibole whatsoever, and yet even a proliferation, even some, chrysotile.

Q. But have you found many? Are you saying that you find no chrysotile in the lung?

A. No, I didn't say that.

Q. In the pleura?

15 A. In the pleura? No, you don't find it in the pleura.

Q. You don't find it in the pleura. All right.

20 A. Now, a leading article again in the Lancet, two or three years ago, pointed out that the consensus of opinion in Great Britain was that no mesothelioma yet have been seen without the presence of amphibole asbestos. I agree with it.

Q. All right. What about lung cancer?

25 A. I do not believe asbestos is a carcinogen in its own right. Certainly...you see, we have no increase in the amount of cancer of the lung in any of our workers, nor have other cohorts of the same way of being examined, than there is existing outside.

30 Where the thing comes in is for two things, one is rather remote, that if you work for an asbestos industry and you develop carcinoma of the lung and you come to post mortem, as invariably you will, then the coroner has very little recourse other than to say well, this is an industrial disease.

5 A. (cont'd.) He needs the information. He needs the information as regards the amount of CA lung, in comparison with the number of people there, and in the time factor, and he will then see...as others have found and we have found...that there is no excess of CA lung in the people, provided you look at smokers and nonsmokers, and the age differences. You'll find it's the same.

10 There is no evidence to suggest that it is a carcinogen.

What there is...and this has become distilled, I suppose...that many, many, many of the asbestotics go on to develop CA lung. This is not so unusual because many other fibrotic situations also lead to carcinoma.

15 But, what is unfortunate is that these people become, I don't know, typed as being asbestos workers - look, another cancer, another cancer, another cancer.

20 What we do not find is carcinoma without asbestosis, and all of these stem from years and years and years back, and we haven't the slightest jot of evidence that carcinoma will result from working in two, five...certainly five, because the evidence that we have, and that Turner has got...that even five fibers per mil certainly does not produce asbestosis, and it doesn't produce carcinoma.

25 It is a pity, I suppose...it keeps people on the QV. I think it certainly prevents them from...everytime we get somebody who has died of a carcinoma of the lung and they haven't got asbestosis or certainly at post mortem there is not the slightest evidence, it makes the others very aware that there has been a report of a death due to industrial cause. Whether it is or not, it doesn't matter. It serves to keep them on their toes. But it's not good for the real epidemiology. It tends to
30 confuse it.

5 Q. I'm not sure I understand your evidence. Are you saying that insofar as lung cancer is concerned that asbestos is not carcinogenic? Is that what you are saying?

A. That's correct, yes. It is not a carcinogen.

Do you know what 3,4 benzpyrene is? Or alpha- and beta-naphthylamine? These are carcinogens and they kill. They produce cancers just at the drop of a hat.

10 Where are the carcinomas in the asbestos industry? Look at the numbers that are employed and have been employed, and the men who leave and are now out in the streets. We should have them dropping dead in the aisles.

15 It doesn't exist, and it doesn't need this fancy epidemiology to look at it. You just have to look at the comparison of people who die and who don't die, and we have hundred and hundreds and hundreds of people in the Retired Employees Association, as to Turners, and they live until they fall under a bus at eighty.

If they have been working with a carcinogen all those years, surely you would see something. But there's nothing.

20 Q. Well, we've had some evidence, we've had some pretty...it seemed at the time, some pretty compelling evidence out of South Carolina of some very elevated statistics for lung cancer in a chrysotile textile operation.

25 A. Well, I am not aware, I do not know anything at all about that cohort, I don't know if the cohort was further examined it would show that there was a predisposition in either groups or familial groups of people, towards cancer. I know nothing at all about these people. I know nothing about their smoking habits or anything. I know nothing about the oil mists.

30 Now, there is another complicating factor. The various people, lots of people who use asbestos also use oil mists, and the oil mist becomes absorbed onto the asbestos.

Now, you've got trouble on your hands if you haven't

A. (cont'd.) made sure that the oil itself is completely noncarcinogenic.

5 Have they done all...I mean, did they do all this work, did they publish it? No. So I'm afraid I can't take a lot of...unless you've got two forms of homo sapiens, two types of caucasians.

10 Q. But when you say insofar as lung cancer is concerned your judgement is that asbestos is not a carcinogen, do you include all types of asbestos?

A. No, I didn't. I said chrysotile.

Q. Just chrysotile?

A. Mmm-hmm.

15 Q. So that if we take all of your evidence together, what you are really telling us is that chrysotile is not carcinogenic?

20 A. This is exactly what I'm saying. And moreover, when you look at the situation as it is today and as it was in the 1930's, you will find that the enormous challenges to the lung caused great fibrosis. That's not the basis, the intermediate zone, even the apices have gone and these people have died and they die rather quickly. The heart is asking for air and it gets bigger and bigger and bigger, and it finally gets them.

These people never live long enough to develop a carcinoma.

25 Now, in my time I have seen the followup of the fiber content and I have seen the type of asbestosis become very much less severe, so what happens is they live to develop a tumor. But if they don't have asbestosis, they don't develop a tumor.

Now, if you can get around that somehow, you get around it, because I can't.

30 Q. But you accept that the amphiboles are carcinogenic?

A. No, I didn't say that.

Q. All right. Do you accept that...

A. No, I don't. I don't accept that the amphiboles per se. We have four amphiboles that we know of, and only one I would say...

Q. All right, crocidolite?

A. Yes.

Q. All right. You accept that crocidolite is carcinogenic?

A. In this peculiar way. But it is less fibrogenic. If it wasn't, if it was not for its almost...well, I don't think there is any argument about association with mesothelioma...it is certainly a much less damaging fiber than chrysotile - much less damaging.

You don't see...

Q. In terms of fibrosis?

A. Yes, it doesn't produce fibrosis. Not as much.

Q. What's your judgement as to the explanation for the differences? Do you come down on the physical or mechanical school, or are you in the chemical school?

A. I'm in the chemical.

Q. Size and shape of fiber?

A. Yes. It's the mensuration that does it.

The mensuration of the fiber, the dimensions, the fact that it won't cleave, the fact that crocidolite will migrate from the hilum outwards, and land up in the pleura. Chrysotile won't do it. It splits first, and then it's no longer capable of penetration.

You can't get something three hundred angstrom units in diameter to penetrate a cell wall.

DR. UFFEN: Can you explain to me how a person who has asbestosis and subsequently dies of lung cancer, what is the cause of the lung cancer?

THE WITNESS: Well, has Allison been here yet?

MR. LASKIN: Yes.

THE WITNESS: Did he tell you about his studies?

MR. LASKIN: He? Oh, I'm sorry. We had Allison McDonald. We didn't have Mr. Allison.

THE WITNESS: Well, although it was a bit embarrassing to the Americans, we employed a term called a CIA, so they didn't like it. It was our eponym for Cancer Inhibiting Agent, and Allison suggested that this...there was a substance that was given off from the lysosomes of cells that were under continuous challenge, and to prove this or to demonstrate it, he put cultures, cell cultures, of histiocytes and had healer cells working...and he put these two together, and so long as he used...I think it was asbestos in this case...so long as he used asbestos to stimulate the macrophage, the cells never took off. The cells remained as...the tumor never developed.

But when he stopped it, the tumor took over.

So, you see, the horrible thing that one might come to - I don't suggest you do - but this evidence suggests that if you take away the stimulus to a macrophage, completely, then you are perhaps laying the situation open for the invasion by tumor.

Now, Davis knows this. It opposes some of his work, but he cannot...and he want on to say that if it were seen, if it were accepted, if this paper was accepted, then his only suggestion could be that people who had been exposed to dust that might lead on to a carcinoma have repeated injections of inert dust for the rest of their lives, to keep this stimulus of the macrophage going.

Now, this is a pretty radical thing to say, but it does appear that there is some form of connection between what

THE WITNESS: (cont'd.) happens in the cell and how it prevents a bad cell line.

5 You see, we...or it is accepted that if a cell is challenged and damaged seven times, between seven and eight times, that a cell is damaged, then its daughter is damaged. If you have a whole series of cell replications and they are all being damaged, around about cell seven or so, eighth generation, you are going to run into a thing that changes completely, and
10 there you have the beginning of a bad cell line which often goes on to produce carcinoma.

 So, I'm afraid you pays your money and takes your pick. Nobody knows. I can't give you an explanation.

 I can offer you just what is conjecture.

15 MR. LASKIN: Thanks, Mr. Hunt. I'm going to turn you over to my friends here, on the left.

 MR. LEDERER: You are really being turned over to nothing, Mr. Hunt. I only have one question.

CROSS-EXAMINATION BY MR. LEDERER:

20 Q. I don't want you to perceive this as an attack or anything. I'm just a little bit concerned.

 You offered us a number of opinions on a wide-ranging area of concerns that are before this Commission, and I noticed that in the middle of it you referred to Dr. Selikoff and some of his work, and indicated to us that there may be a problem because
25 when you look behind his work and look at the people who did the work, it may be that the work is not that high a quality.

 A. Mmm-hmm.

 Q. So I would presume with me that the quality of the work that forms his conclusions is of some concern.

 I'm sorry, can you hear me?

30 A. Not very well.

5 Q. All I'm asking is, what I took from that comment is that the quality of the work on which, for example, Dr. Selikoff based his conclusion is of some concern to you? You want to know what that work is and what the quality is before you evaluate his conclusions?

A. Yes.

10 Q. Now, what's bothering me here...and as I said at the outset, I don't want you to take this as an attack, I simply raise it as a concern...for all the opinions that you have given us today, we don't seem to have any studies or any of that kind of work on which we could, or this Commission could, in its endeavors, evaluate the basis upon which you have formed those conclusions.

15 I take it, from the papers that you presented to us, that what we are really being asked to rely on here is your work experience in some twenty-three years in this field?

A. No, no. No. Much of this has been published by other people. You can have those papers.

20 Q. But you haven't brought those publications with you, we don't have those studies here. That's my only concern.

A. No.

Q. I beg your pardon?

A. No. Go on.

25 Q. And would you agree with me then, and I think this is self-evident, for us to be able to properly evaluate all the conclusions that you have given us today, we would need to have those studies and those papers - in the same way that you evaluated some of Dr. Selikoff's work. Is that fair?

30 A. Well, it depends upon whether...either you believe all that you read. I don't believe you are that foolish. I don't believe you would do that. But does it give it greater veracity to have it in print in a journal? That is where the delusion

A. (cont'd.) comes in, sir.

Q. Well, it gives a greater veracity to have the scientific material before you to evaluate. That's what gives it the veracity.

But again, I'm not suggesting that...you know, I don't want you to misunderstand this. Again, it's not an attack. I'm simply saying to you that we are a little bit deficient, it seems to me, in the information that we have and it would be, I think, inappropriate for me, in my position here, not to raise that as a concern, and I'm simply asking you whether or not you wouldn't share that concern with me if we could magically place you in one of the seats of the three commissioners here?

A. You've lost me there by putting me in the seats of the commissioners. You lost me there.

These are...all of this is reported, but it is not the kind of reprint that you would perhaps accept. These are works that have been reported to the ARC, and the Asbestos Research Council, I suggest, has over the years had a greater... there is a greater depth of study in the ARC than the editor of a journal.

I do not believe in publication for publication's sake.

DR. UFFEN: Do the publications for the...does the work of the ARC receive what we call peer assessment?

THE WITNESS: How do you think the five-micron fiber got out into the world? That was the ARC making a big mistake, and its opinion has, I'm afraid...you can't have it both ways. Either you accept the fact that the ARC is wrong, that it is right, or it can be either.

So I'm afraid...

DR. UFFEN: Was it a peer judgement or not?

THE WITNESS: What?

5 DR. UFFEN: I'll start again. You referred to the work of the ARC and its publications. All I want to know is, does that work go through the normal process of peer judgement, similar to the one when a scientific paper is published in a scientific journal?

THE WITNESS: Well, for many years, the only peers were on the ARC. There was no one to judge it.

10 DR. UFFEN: That's all right. That's a good answer. It tells me exactly what I wanted to know. Perhaps it tells you, too.

15 THE WITNESS: But these are their annual reports put out by the ARC. There is no reason why they shouldn't be seen. This revolves upon the kind of work that we do, I do, Davis's work, everybody else's work. It's all there.

20 MR. LEDERER: Mr. Chairman, I only really have the one point that I wanted to make, and I suspect that I could argue back and forth for some time with Mr. Hunt about it. It's a fairly straightforward point and given the environment in which this Commission is operating, I really don't think it's of much value to press it any further.

25 All I suggest to you, Mr. Hunt, is that I personally, given the wide range of conclusions and opinions that you have brought to this Commission, have some concern that we really don't have the ability...or let me put it differently...we don't have an appropriate amount of ability, if that were an appropriate use of English, to judge the basis on which you have formed those conclusions, and that's really my only point.

30 I don't know whether you have any further comment on that. In fairness, I probably should give you that opportunity.

Do you have anything further to say about that?

THE WITNESS: I was wondering whether you could be more specific? There must be some things that have been said that

THE WITNESS: (cont'd.) you have said to yourself, well, where is the proof.

Now, would you like to mention anything out of that lot?

Q. Well, you've made the statement, as I understand it, and I hope I'm not misstating it...I should tell you that I am much newer to all of this than anybody else, and I'm a little bit in the midst of a struggle to understand even some of the basic concepts in terms that are being discussed...but one of the things that you have said which I understand is open to some controversy is that the chrysotile does not^{cause}/carcinomas, and I gather that that's an area of some considerable controversy even in the evidence that has been before this Commission.

Now, that is a very important, it seems to me, and significant statement. But when you make it and I look for the papers or the studies or the tests or whatever, that you have done to support that conclusion, I don't have anything here.

All I have is your statement that you have worked in this field for twenty-three years.

Now, that may be a perfectly legitimate basis for you to bring forward this evidence. My problem is that just as you say you have questions about Selikoff's work, I might...or more importantly, the people who would understand your work - and I probably wouldn't...might have questions about whether or not your work supports those conclusions.

A. You are quite right. You are absolutely right. Why should you believe anything I just said to you off the top of my head, although I don't think it's quite off the top of my head.

Q. That is quite clear.

A. You have had a man here recently, or some time, this man Berry that you had here, he just produced another study

A. (cont'd.) of a factory.

MR. LASKIN: Friction materials, Ferrota.

THE WITNESS: Yes. And he found the same thing.

You find the same thing with ordinary animal work.

This isn't something that I've thought, you know, it can't be this or it can't be that, let me go and count heads. That isn't the result of it.

The evidence all points towards this and the evidence all points to Dr. Selikoff's idea that individual fibrils...and Langer's idea...that individual fibrils are of importance in this matter, is driven...and he has now been made to admit this, but he thought it better to err, so I don't blame him for erring on the side of safety.

MR. LEDERER: Mr. Chairman, that's really the only question I wish to raise.

DR. DUPRE: Dr. Uffen, any further questions?

DR. UFFEN: Could I take just a minute or two about...

DR. DUPRE: Please.

DR. UFFEN: ...another area which I'm not sure whether you are going to draw on, but we would like the benefit of your opinion and advice and experience on substitutes for asbestos, and I think paper number six, which is really quite an important one...I think it's six...

THE WITNESS: Well, is it in here?

DR. UFFEN: Yes, it ought to be in there.

MR. LASKIN: Tab six, Mr. Hunt.

DR. UFFEN: His aren't numbered, so he can't find them as easily as we can.

Has it got a number on it?

THE WITNESS: Yes.

DR. UFFEN: Oh, number six.

THE WITNESS: What page?

DR. UFFEN: Page twenty-eight.

THE WITNESS: Twenty-eight? Yes.

DR. UFFEN: There is a section on alternatives to asbestos.

THE WITNESS: All right.

DR. UFFEN: We would like...or I would like your advice on it, especially in the area where we now appear not to have substitutes - brake linings.

What are the factors that determine whether or not we are likely to be able to have a substitute for asbestos in brakes?

THE WITNESS: I do hope that you will not think me hidebound, being too hidebound, when I say that I cannot really tell you of the work that is going on, say in Mintex. They are actively pursuing the use of substitutes.

But I can say...I'm afraid I can't tell you what materials they are using...but they are not fibrous, not fibrous.

But we are now being beset, and for the last two months I have written a number of letters to people who I believe sincerely are making a great mistake. They are using substitutes - mostly of an aluminum silicate nature, but others also - and as they are not asbestos, they are taking no precautions whatsoever.

We have done some monitoring on these people recently, over the past three or four months, and we have found that they are being challenged by literally enormous numbers - twelve, thirteen, fourteen fibers, and they are all respirable, which unless you knew, you would not be able to distinguish them from asbestos.

So we had to warn these people that provided that there are...that there is a respirable fraction within the bulk material they are using, they cannot just assume that it is safe.

5 THE WITNESS: (cont'd.) The work done by Davis and others - Bigliani (phonetic) and other people, are strongly suggestive of the fact that given the right size and shape, this dimension will occur, and I think it would be a terrible thing after all the people who have it became ill or died and whatnot, that we should in thirty years time have made the same mistake as we made thirty years ago.

10 DR. UFFEN: Could I follow this in one area which you have already referred to today, and that is, you referred to zeolite.

Zeolites occur in nature. I notice you discussed here basalt fiber.

THE WITNESS: Yes.

15 DR. UFFEN: Now, there is a rock very similar to basalt that has a lot of natural zeolite in it. Is there a danger that we could turn to a natural alternative containing zeolite, and then inadvertently perpetuate the problem?

20 THE WITNESS: I don't think now, not now. I do not believe that the people who must be...whose opinion must be sought, would ever countenance the use of a natural substance before it was fully investigated as to its potential respirable fraction. I cannot visualize that situation occurring.

25 Manmade fibers, however, are a little different. They are making them, they want to sell them. They are telling people that...this is a crass lie, you know...the average diameter of our products is three-and-a-half microns. They are all good...and it is, we have checked them over.

But the size distribution at this end is enormous - point five, one and one point five - and in numbers it's enormous, in mass, it's very little. It's rather wretched, I think.

30 It affects this because there isn't much up this end, not a lot. It's just hovering around here. But this is

5 THE WITNESS: (cont'd.) insufficient to counteract the fives and sixes and seven-micron diameter fibers. So you've got a mean of three and a half, but it isn't fair, because down here, the same with asbestos, the same with other things, there's an enormous amount of respirable dust and I believe this is very dangerous.

10 It is, after all, an aluminum silicate. It's a silicate. We don't know...why should we try and guess and assume that we know anything at all about these silicates. They've only been in use five, six years. We've only been producing glass, that can be taken into the alveoli, for nine years. And yet people judge glass by the previous glass that was made, the stable glass, you know, that could never be breathed.

15 So, well, I think that substitutes have to be looked at extremely carefully, on their merits.

DR. UFFEN: And it would be the size...

THE WITNESS: Yes.

DR. UFFEN: ...and aspect that would be the important physical parameters?

20 THE WITNESS: Yes.

25 You know, the way they are made it becomes almost impossible to produce a spectrum of sizes that would be insignificant to anybody working and breathing them in controlled situations. You cannot make candy floss...this is really what it is...you can't make candy floss and govern every fiber. You can't do it.

DR. UFFEN: But there are certain kinds of products, manufactured products, that could substitute for fibrous materials sometimes...

THE WITNESS: Yes.

30 DR. UFFEN: ...which are spherical, or roughly spherical, most of the time.

THE WITNESS: Yes.

5 DR. UFFEN: Is it your opinion that they would be less hazardous than fibrous materials?

THE WITNESS: I believe it's not in anyone's interest to produce material with spheres, say, less than five microns. After all, five microns is the cutoff we have in the coal industry, as being able to enter the alveoli - between five and seven microns is the cutoff. Bigger than that, they can't be.

10 So it is unreasonable, it is...well, unreasonable... it's rather silly to think that people would use material which is made out of spheres, that would be smaller than this. Therefore, if they are not smaller than this, how can they be taken into the alveoli. Therefore, in this respect they can't be dangerous.

15 It is only the fact that a fiber does this, not that. It goes in that way. Now, there is no other aspect to a sphere. A sphere is a sphere, whichever way you look at it.

DR. UFFEN: Are you familiar with fly ash?

THE WITNESS: Yes.

20 DR. UFFEN: Is fly ash a potential hazard?

THE WITNESS: Well...

DR. UFFEN: In lung problems?

THE WITNESS: What's his name? He is the fly ash man? Fisher.

25 DR. UFFEN: It's Dr. Fisher of the Pattel Laboratories.

THE WITNESS: That's right. He gave a very illuminating, really wonderful paper, down in Arkansas, two or three weeks ago. It really was something.

30 Yes. The answer is yes, because in his opinion, the work he has done with fly ash, it is quite a strong mutagenic substance causing, in his cell cultures, quite severe damage.

But I think if you are really interested in fly

THE WITNESS: (cont'd.) ash, he's the chap to contact.

5 DR. UFFEN: Just for the record, the reason why I would raise this is, fly ash is very plentiful from any industry that burns coal, and it is proposed to use it as a substitute for asbestos in certain kinds of concrete.

But I'm quite clear, you've said that it is mutagenic?

10 THE WITNESS: I'm very interested in fly ash, too, because it is used as a substitute for asbestos in other things, other than concrete.

DR. UFFEN: What kind of things?

THE WITNESS: I am not prepared to say.

15 DR. UFFEN: I find your response quite different from the previous responses all morning long.

THE WITNESS: Well, it's something I...I am interested in this because of the ..

DR. UFFEN: Is it for a commercial...

20 THE WITNESS: ...stimulus that caused me to become interested in it. You can read into that what you wish, but I am not prepared to discuss it any further.

But I would not suggest...that's why I say, you get onto this chap. He will tell you all about fly ash - far more than I ever can.

25 DR. UFFEN: Could I word my question in a way that won't embarrass you then, because we know you are here as a visitor and quite voluntarily. Did I touch on something which you think this Commission ought to pursue a little more vigorously?

30 THE WITNESS: No, I don't. But it is something to do with a process which I believe is, at the moment, it is the sole prerogative of the people who are doing it, and I'm not going to discuss it because I have not got permission to do so.

THE WITNESS: (cont'd.) Let's put it that way.

I mean, if you were to ask me how many cases of mesothelioma and how many cases of asbestosis we have in the plant, I wouldn't answer you because I have not got permission to do so. I will not give figures of this nature unless you write to the people over there, and they can give them to you. But not I. That's why I talk so generally. I will not give them. It's not within my agreement to do this.

DR. UFFEN: I respect your comment there, but as a commissioner I am left with sort of a concern that I may have stumbled onto something of consequence and I don't know quite why.

THE WITNESS: Well, you raised it. Not I.

DR. UFFEN: All right. Fair enough.

THE WITNESS: I was generous in telling you that fly ash has some, surely, some...you should be warned about fly ash. It is the second most available substance...certainly in the United States, as it may be in Canada, too...and its use should be put to something. This is why the investigations have been going on for so many years - years and years.

But nobody has been...what should I...it hasn't become well known about this. But now it has been published.

DR. UFFEN: Thank you.

DR. DUPRE: Mr. Hunt, just one question which takes us back again to tab number six, and at page twenty-four in that paragraph three point seven that Mr. Laskin has already discussed with you...

THE WITNESS: Page twenty-four?

DR. DUPRE: Twenty-four, paragraph three seven.

THE WITNESS: Yes.

DR. DUPRE: The opening words: "In our experience there have been fifteen cases", now does 'our experience' there coincide exactly with the experience that is referred to in

5 DR. DUPRE: (cont'd.) paragraph three two on
page twenty-three? Namely: "In a particular weaving shed,
operating since 1920", you have found fifteen
cases of mesothelioma?

THE WITNESS: Go on. Yes.

DR. DUPRE: That is correct?

THE WITNESS: Oh, no, no. There is no relation
between the two at all.

10 DR. DUPRE: No relation between the two?

THE WITNESS: No.

By the way, I didn't write this lot. A lot of
this is a lot of nonsense, really. I would never have written
this stuff. Some of it is misleading. It's not as if it is
really criminally wrong, but it isn't very good. It isn't
15 very well written.

DR. DUPRE: Okay.

THE WITNESS: But this is.. I mean, what is this...
1976, was it? 1977?

DR. DUPRE: It's a submission to, of course,
20 the Simpson Committee.

THE WITNESS: Yes, which is 1977.

DR. DUPRE: Well, I take it that I should look
at this as not atypical of the kinds of submissions that most
commissions have seen?

THE WITNESS: I'm sorry?

25 DR. DUPRE: I should take this as not atypical of
the kinds of submissions that most commissions have seen?

THE WITNESS: I don't understand.

DR. DUPRE: Well, an occupational disease of
being on a commission is that one is very often subject to
written submissions from various parties...

30 THE WITNESS: Yes.

DR. DUPRE: ...that, shall we say, have different degrees of looseness to the statistics cited and so on.

5 THE WITNESS: When I wrote this thing, I wrote this for BBA as my contribution to this submission. I then saw how it finally came about, because a lot of people had a hand in this, and I thought well, they really have diluted what I said. I was a lot stronger than this, I can assure you.

10 Anyway, I was able to put it right at the Commission. I said what I believed to be the case, rather than what was written down here.

But this figure of fifteen must be up in the forty mark now, and it will be even higher. We are going to touch a couple of hundred, I'm sure, by another ten years time.

15 DR. DUPRE: Could you tell me something, if you can recall this. Are your mesothelioma victims very often relatively young...that is to say, in their fifties...or do they tend to be older or retired workers?

THE WITNESS: No, no. The former.

DR. DUPRE: Young?

20 THE WITNESS: I may joke about it, but I'm very saddened when I see men dying at fifty or sixty, especially when they are dying towards the time for retirement. They have been servants, they have been good workers, or they've been workers at any rate, and they have nothing to look forward to except to about a year of severe pain and then death.

25 I think it's very, very sad.

30 I don't say it's any less sad if you are thirty years of age, as has occurred. But these are of this order, and the time, now, is just about right for the dwell time for when they were in just during the war and after the war when the thing was laid down, if you like.

THE WITNESS: (cont'd.) The upsetting thing, mostly, is that there is nothing we can do.

5 We had a chap named Rosiki (phonetic) and we persuaded him, and he became...this is where the physician, the asbestos-related disease clinic that I partly run with this physician, we have already submitted, I think, nine or so cases of mesothelioma for pleural stripping. He stripped the pleura off completely, and removed a part of the lung, and this thing
10 is called a pleurectomy, and it does lead to an extension of life. Instead of dying within say a year or less, the effusion is stopped and, you know, we get three or four years longer.

The end is inevitable, but life is very sweet if you can get another three or four years out of it.

15 But this chap died and I'm afraid I don't know, we don't know of another surgeon who would be prepared to go on and do this kind of work.

Now, what I have asked the firm to do is this: I have asked them to support, in money terms, a letter...you see, it's very difficult to write a letter, but I have to write a letter to all of the physicians who live in the area where these
20 people live, and ask them to let us know or somehow report to us...me or somebody else...anybody who has ever worked in asbestos who goes to see them with a pain in the chest. It doesn't have to be anything more than a pain in the chest. Then we would then get them thermographed, we would get special
25 x-rays done, we would get them into a cytology situation where we would look at any effusion, and perhaps, just perhaps, in that way we might be able to catch these wretched tumors early enough to be able to do something about them.

30 I can say no more than that. But there is nothing else we can do. There is no...I mean, after all, by the time the thing is making itself clinically manifest, you've only got

THE WITNESS: (cont'd.) a year or so left.

But many of the people they tell us have felt distinct...there is no dyspnea, there is no...but they have felt pain, vague pains. We want to see these people with these vague pains. It's the only lead we've got.

I mean, you can't even find them...it would be worth every penny at five pounds or ten dollars a throw - we would x-ray the lot. But you wouldn't see anything. Not at that stage.

So we've got no answer, and it's very distressing. Very distressing.

DR. DUPRE: Now, again on that paragraph to which I drew your attention on page twenty-four, where you point out that now there have been probably close to forty cases of mesothelioma, the rest of that paragraph continues to hold, does it? That of these forty or so cases, all were exposed to crocidolite in varying degrees...

THE WITNESS: Yes.

DR. DUPRE: ...and no cases where chrysotile only was implicated?

THE WITNESS: I did...if I haven't made a caveat apparent here, I wish to do so, that it is almost certain that what seemed to be crocidolite in three cases or four cases, has turned out to be tremolite. This was identified by the people at Cardiff.

Now, I cannot say whether in addition to tremolite there is also crocidolite, because in these cases the men were known to have had crocidolite exposure. But according to the analysis, that which was seen, the amphibole which was seen in the lung specimen, was tremolite.

But then again, when you've got such a long dwell time - thirty or forty years coming in between - it's not surprising.

5 DR. DUPRE: One last question. When you were discussing with Mr. Laskin the cases of mesothelioma that have been found among family members, are the cases that you have found cases that are among family members of the groups of employees that are referred to...

10 THE WITNESS: No, none. It would have been very instructive, I suppose you could say, to have had such material available. We never have had. I suppose it's a good thing.

10 These came from the normal processes of pathology where the tissue was handed over to me for processing and identification by the Mesothelioma Panel.

15 I then went and investigated the exposure history of these people, and found out that four of them, as I said, never were employed. But, they were the siblings, the offspring, of people who had been employed.

20 Then later on other people have found the same, and I would suggest that this has been an occult kind of source of mesothelioma, possibly stretching over many, many, many families and many years. But I would repeat there is not the slightest evidence to suggest that casual living in this century anywhere near an asbestos work has been responsible for either tumor formation or any other lung damage.

25 DR. DUPRE: Well, Mr. Hunt, thank you very much indeed for acceding to our invitation to come here. You have been most kind to us.

We now rise until Monday morning.

MR. LASKIN: Nine o'clock.

DR. DUPRE: Nine o'clock.

DR. UFFEN: Is it nine o'clock? Ten, I thought.

MR. LASKIN: Is it ten o'clock?

30 DR. DUPRE: Until ten o'clock.

MR. LASKIN: Sorry, Dr. Uffen.

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DR. DUPRE: Until ten o'clock on Monday morning.

THE INQUIRY ADJOURNED

THE FOREGOING WAS PREPARED
FROM THE TAPED RECORDINGS
OF THE INQUIRY PROCEEDINGS

Edwina Macht
EDWINA MACHT

